FINAL REPORT
MIDNITE MINE SITE
ECOLOGICAL RISK ASSESSMENT
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LIST OF ACRONYMS and ABBREVIATIONS

Ag	silver
AHQ	adjusted hazard quotient
Al	aluminum
A/L	acute/lethality
ARAR	Applicable or Relevant and Appropriate Requirements
As	arsenic
AOI	area of interest
AUF	area use factor
Ba	barium
BAF	bioaccumulation factor
BCG	biota concentration guide
Be	beryllium
BERA	baseline ecological risk assessment
BM	benchmark
BTAG	Biological Technical Assistance Group
BW	body weight
Ca	calcium
$CaCO_3$	calcium carbonate
Cd	cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CL	confidence limit
cm	centimeter
Co	cobalt
COC	contaminant of concern
COD	chemical oxygen demand
CPOM	coarse particulate organic matter
Cr	chromium
Cr III	trivalent chromium
Cr VI	hexavalent chromium
Cu	copper
COPC	contaminants of potential concern
CT	central tendency
DMC	Dawn Mining Company
DOM	dissolved organic matter
dw	dry weight
EC	exposure concentration
EMB	environmental media based
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
FDR Lake	Franklin D. Roosevelt Lake

Fe	iron
FPOM	fine particulate organic matter

LIST OF ACRONYMS and ABBREVIATIONS (continued)

Hg	mercury
HI	hazard index
HQ	hazard quotient
K	potassium
LEL	lowest effect level
LOAEL	Lowest Observable Adverse Effect Level
m	meter
m^2	square meter
MA	Mined Area
Mg	magnesium
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
m/km	meters per kilometer
mm	millimeter
Mn	manganese
Mo	molybdenum
Na	sodium
NAWQC	National Ambient Water Quality Criteria
Ni	nickel
NOAEL	No Observable Adverse Effects Level
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPP	net primary productivity
NRWQC	National Recommended Water Quality Criteria
ORNL	Oak Ridge National Laboratory
Pb	lead
pCi/L	picocuries per liter
pCi/g	picocuries per gram
PCP	Pollution Control Pond
PIA	Potentially Impacted Area
PEC	probable effect concentration
ppm	parts per million
PRG	preliminary remediation goal
Ra	radium
rad/day	rad per day
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
Sb	antimony
SDL	sample detection limit
Se	selenium

SEL	severe effect level
SLERA	screening level ecological risk assessment
SMI	Shepherd Miller, Inc.
SO_4	sulfate

SQG	sediment quality guideline
STI	Spokane Tribe of Indians
STWQC	Spokane Tribe Water Quality Criteria
T&E Species	threatened and endangered species
TEC	threshold effect concentration
Th	thorium
TIR	total ionizing radiation
Tl	thallium
TRV	Toxicity Reference Value
U	uranium
µg/L	microgram per liter
µS/cm	microsiemens per centimeter
USDOE	United States Department of Energy
U.S. FWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	vanadium
WA	work assignment
WAM	Work Assignment Manager
WP	Work Plan
WQC	Water Quality Criteria
WTF	water treatment facility
Zn	zinc
%	percent

EXECUTIVE SUMMARY

An ecological risk assessment (ERA) was conducted for the Midnite Mine site on the Spokane Indian Reservation in Stevens County, Washington. Midnite Mine is an inactive open pit uranium mine that was added to the National Priorities List (NPL) in May 2000. Mining of the ore by the Dawn Mining Company (DMC) between 1955 and 1981 resulted in the releases of metals and radionuclides.

The site is defined by the mined area (MA) and the potentially impacted area (PIA). The MA presents a dominant impact to the ecosystems as a visibly disturbed area of approximately 343 acres providing limited and poor quality habitat for wildlife. The MA is characterized as a rocky landscape with limited vegetation. The MA contains five lacustrine habitats designated as Pit 3, Pit 4, Blood Pool, Pollution Control Pond (PCP), and the Outfall Pond. Each of these lacustrine habitats are artificial formations evolved from the mining operations and are contaminated with metals and radionuclides. Pit 3 and the PCP have the highest concentrations of contaminants. The MA is an attraction to wildlife for watering and presumably consumption of mineral salts deposited around the lacustrine habitats. A number of animals (e.g., deer, elk, moose, coyote, bear, and turkey) have been sighted within the MA. In addition, some animals (e.g., marmots and cliff swallows) have been observed to reside within the MA for more extensive periods of time.

The PIA encompasses areas adjacent or near the MA including upland areas that may have been affected by the mining activities, two haul roads (East and West Haul Roads) that run through the PIA to the MA, and downstream drainages that flow into Blue Creek. The upland PIA is largely undisturbed by mining activities and is dominated by an overstory of either ponderosa pine or a mixture of ponderosa pine and Douglas fir trees. The two haul roads (East and West Haul Roads) running through the PIA are unpaved roads that were surfaced with gravel and waste rock originating from the MA. In addition, material lost from haul trucks along with dust and runoff from the roads may have affected areas adjacent to the roads.

Runoff from the MA enters seven drainages: Western, Central, Eastern, Northeastern, Northern, Far Western, and Southwestern Drainages. The Eastern Drainage receives flow from the Northeastern Drainage and, south of the site, from the Western and Central Drainages before entering Blue Creek. The flow conditions of these drainages from late fall to spring is essentially based on mine drainage, seasonal precipitation, and snow melt. A seep collection system that operates year round back-pumps the seepages collected from the Eastern, Central and Western Drainages to Pit 3 in the MA. From spring to fall, the onsite water treatment facility (WTF) dewaters Pit 3 and Pit 4 and treats the water for metals removal before discharging to the Eastern Drainage. Discharge from this WTF, which is regulated under a federal discharge permit, can contribute greater than 95 percent (%) of the flow to the Eastern Drainage. Higher risks would be anticipated if the implementation of runoff controls, seep collection, and water treatment were not reducing the overall loading of site contaminants to AOIs within the PIA.

This ERA follows the Environmental Protection Agency (EPA) guidance of the Superfund Program (U.S. EPA 1997) for assessing risk from metal contamination and the United States Department of Energy (U.S. DOE) guidance (U.S. DOE 2002) for evaluating the risk from total ionizing radiation (TIR) to aquatic, riparian, and terrestrial biota. This ERA report encompasses a screening level ecological risk assessment (SLERA) and the baseline ecological risk assessment (BERA).

The SLERA , detailed in Section 2, retained contaminants of potential concern (COPC) for the BERA in surface water, instream sediments, riparian sediments, and soils based on conservative benchmark (BM) values and maximum metal concentrations measured at each area of interest (AOI) within the MA and PIA. Total ionizing radiation (TIR), screened based on the maximum exposures of the mine-related radionuclides, indicated that: the recommended USDOE dose criterion of 1.0 rad/day was exceeded for the protection of aquatic animals in the MA and PIA; the recommended USDOE dose criterion of 0.1 rad/day was exceeded for the protection of riparian animals in the PIA; the recommended USDOE dose criterion of 0.1 rad/day was exceeded for the protection of terrestrial animals in the MA and PIA; and the recommended USDOE dose criterion of 1.0 rad/day was exceeded for the protection of terrestrial plants in the MA.

The BERA, presented in Sections 3 to 9, begins with the problem formulation followed by the analysis and risk characterization phases. The problem formulation identified 22 assessment endpoints encompassing the aquatic, riparian, and terrestrial ecosystems within the MA and PIA to be characterized for risk from mine-related metals and radionuclides.

Assessment Endpoint #1: Viability and function of the periphyton community.
Assessment Endpoint #2: Viability and function of the benthic macroinvertebrate community.
Assessment Endpoint #3: Viability and function of the fish community
Assessment Endpoint #4: Viability and function of the terrestrial soil community.
Assessment Endpoint #5: Viability and function of the terrestrial plant community.
Assessment Endpoint #6: Viability and function of the herbivorous mammal community.
Assessment Endpoint #7: Viability and function of the carnivorous mammal community.
Assessment Endpoint #8: Viability and function of the omnivorous mammal community.
Assessment Endpoint #9: Viability and function of the piscivorous mammal community.
Assessment Endpoint #10: Viability and function of the soil invertebrate feeding mammal community.
Assessment Endpoint #11: Viability and function of the insectivorous avian community.
Assessment Endpoint #12: Viability and function of the omnivorous avian community.
Assessment Endpoint #13: Viability and function of the soil invertebrate feeding avian community.
Assessment Endpoint #14: Viability and function of the carnivorous avian community
Assessment Endpoint #15: Viability and function of the piscivorous avian community.
Assessment Endpoint #16: Viability and function of the herbivorous avian community
Assessment Endpoint #17: Viability and function of the amphibian community
Assessment Endpoint #18: Viability and function of the wetland plant community
Assessment Endpoint #19: Viability and function of the wetland invertebrate community
Assessment Endpoint #20: Observable Reductions of Survival and Reproductive Capability in Aquatic Animal Populations Related to Total Ionizing Radiation Exposure.

Assessment Endpoint #21: Observable Reductions of Survival and Reproductive Capability in Riparian Animal Populations Related to Total Ionizing Radiation Exposure.

Assessment Endpoint #22: Observable Reductions of Survival and Productivity and/or Reproductive Capability in Terrestrial Plant and Animal Populations Related to Total Ionizing Radiation Exposure.

Assessment Endpoints 1, 2, and 3 served to characterize risk of metal contamination to the aquatic ecosystems in the MA and PIA. Terrestrial ecosystems within the MA and PIA were characterized for risk based on assessment endpoints 4 through 16. Assessment Endpoints 4 and 5 served to characterize risk to the soil microorganisms and plant communities while Assessment Endpoints 6 through 16 served to characterize risk to the mammalian and avian communities. Assessment Endpoints 6 through 16, incorporating aquatic, riparian, and the terrestrial ecosystems within the project area, were evaluated through the use of food chain models. Four exposure models were used for each avian and/or mammalian receptor species to estimate exposure between abiotic exposure (i.e., surface water, sediments, or soils) and total exposure (i.e., abiotic exposure plus dietary component).

Three assessment endpoints served to characterize risk to the riparian/ wetland habitats within the PIA. Assessment Endpoint 17 served to identify risk to the amphibian community and Assessment Endpoints 18 and 19 served to characterize the risk to wetland plant and invertebrate communities. Three assessment endpoints (20, 21, and 22) were identified for characterizing risk from TIR. Risk to each of these assessment endpoints followed the same procedures as the SLERA with the exception that the central tendency concentrations of the site-related isotopes were used for calculating TIR exposure instead of the maximum concentrations. A summary of risk to each of these ecosystems - aquatic, terrestrial, and riparian/wetland - follows:

Aquatic Ecosystems

Risk was based exclusively on conservative screening-level BM values and maximum concentrations of metals in surface water and sediments and concluded that the aquatic communities, encompassing the periphyton, benthic macroinvertebrate, and fish communities, are at risk in the MA and PIA.

The lacustrine habitats within the MA presented a higher number of COPCs exceeding the BM values than the AOIs within the PIA. In addition, the hazard quotients (HQ) for several of the COPCs, particularly for aluminum (Al), beryllium (Be), cadmium (Cd), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn), nickel (Ni), silver (Ag), selenium (Se), uranium (U), and zinc (Zn), tended to be one to two orders of magnitude higher within the AOIs of the MA than the PIA. The PCP and Pit 3 ranked the highest as contaminated habitats within the MA based on having a higher number of COPCs present and the most elevated HQs.

The drainages within the PIA tended to have a higher number of COPCs than the AOIs within Blue Creek. The predominant COPCs in the drainages and Middle Blue Creek included Al, barium (Ba), Be, Cd, Co, Cu, Pb, Mn, Ni, Se, U, and Zn. Upper Blue Creek and Lower Blue Creek had the least number of COPCs present.

Risk to the aquatic ecosystems was based primarily on screening level BM values along with some supporting evidence from site-specific studies conducted in March 2003. Regardless of the poor water quality conditions (low pH, high sulfate, high hardness) in the lacustrine habitats in the MA, the high metals concentrations in surface water and sediment pose substantial risk. The PIA drainages are also characterized by poor water quality; additionally several drainages flow intermittently or have low-flow conditions that could impact the aquatic community. However, the wide range and magnitude of COPCs in the PIA drainages pose risk to the aquatic communities independent of the other factors.

Terrestrial Ecosystems

Modeling risk to the terrestrial ecosystems integrated aquatic, riparian/wetland, and terrestrial systems. The terrestrial systems incorporated the MA and four AOIs within the PIA including the Northeast PIA, Southwest PIA, East Haul Road, and West Haul Road. The aquatic systems incorporated the sediment and surface water exposures for the aquatic habitats within the MA and PIA while the riparian/wetland systems incorporated six riparian AOIs within the PIA.

Terrestrial Soil Community

Risk to the terrestrial soil community was based exclusively on surface and subsurface soil concentrations exceeding conservative BM values. Chromium (Cr), Mn, U, vanadium (V), and Zn in surface soils exceeded the BM values at all AOIs within the MA and PIA. Arsenic (As), Co, Cu, molybdenum (Mo), and Ni also exceeded BM values at some locations. Four COPCs - Cd, Pb, Se, and thallium (Tl) - exceeded the BM values only at the MA.

Subsurface soil Cr, Mn, U, and V exceeded BM values at all AOIs in the PIA. Arsenic exceeded its BM at some locations. Molybdenum and Zn exceeded BM values at only the East Haul Road.

Terrestrial Plant Community

Risk to the terrestrial plant community was based exclusively on surface and subsurface soil concentrations exceeding screening level BM values for plants. Chromium, Mn, U, V, and Zn exceeded plant BM values at all of the AOIs within the MA and PIA. Arsenic, Co, Mo, and Ni exceeded the plant BM values at some locations. Cadmium, Pb, Se, and Tl exceeded the plant BMs only at the MA.

Subsurface soil Cr, U, and V exceeded the plant BM values at all of the AOIs in the PIA. Arsenic, Mn, and Zn exceeded the plant BM values at some locations. Molybdenum exceeded the plant BM only at East Haul Road.

Herbivorous Mammal Community

Three receptors - white tailed deer, meadow vole, and muskrat - were used for modeling dietary exposure risk to the herbivorous mammal communities utilizing the terrestrial, aquatic, and riparian areas at this site. When white-tailed deer was modeled, risk was driven by surface water and incidental soil ingestion. When meadow voles or muskrat were modeled, risk was driven by metals in plant tissue. There was model-calculated risk to the herbivorous mammal communities from abiotic exposure to Se, U, and V in the MA; U in the West Haul Road and the Central Drainage; and U in the Central Drainage riparian area. There was model-calculated risk to the herbivorous mammal communities from total exposure to Mn and U at each AOI within the MA and PIA.

There was model-calculated possible risk to the herbivorous mammals for most of the remaining COPCs within the MA and PIA, primarily driven by the dietary component.

Carnivorous Mammal Community

The coyote and bobcat were used for modeling dietary exposure risk to the carnivorous mammal communities utilizing the terrestrial areas within the MA and PIA at this site. Risk was driven by the dietary component which was based on maximum literature-derived bioaccumulation factor (BAF) values for small mammals. There was model-calculated risk to the carnivorous mammals from total exposure to Cd, Mo, Se, U, and Zn in the MA and from exposure to Cd and U in the East and West Haul Roads.

Possible risk to carnivorous mammals may exist from abiotic exposure to Se, U, and V in the MA and U in the West Haul Road. Risk may also exist to the carnivorous mammals from total exposure to Pb and V in the MA, and from exposure to Cd, Se, Mo, U, and Zn within the PIA depending on location.

Omnivorous Mammal Community

The deer mouse and raccoon were used for modeling risk to the omnivorous mammal communities utilizing the terrestrial and aquatic areas within the MA and PIA at this site. When the deer mouse was modeled for the terrestrial areas, risk to the omnivorous mammal community was driven by the metals concentrations in soil and surface water including As, Mn, Mo, Se, and V in the MA; As, U, and V in the Haul Roads; and V in the Northeast PIA and Southwest PIA.

When the raccoon was modeled for the aquatic areas, risk to the omnivorous mammal community was primarily driven by abiotic exposure of U in the MA and by total exposure of Mn and U at several AOIs within the PIA.

Risk to the omnivorous mammal community may exist from V in the MA and from Ba, Cd, Se, and V at the AOIs within the PIA.

Piscivorous Mammal Community

The mink was used for modeling dietary exposure risk to the piscivorous mammal communities utilizing the aquatic systems within the MA and PIA. Risk was primarily driven by the dietary component which was based on maximum literature-derived BAF for fish. Risk to the piscivorous community in the MA was driven by predicted Cd, Ni, and U in fish particularly at Pit 3, PCP, and the Blood Pool. In the PIA the piscivorous mammal community was at risk from predicted Cd, Ni, and U in fish at the Central Drainage and U in fish at the Upper Eastern Drainage. Risk to the piscivorous mammal community was also driven by abiotic exposure of U at the PCP in the MA and at the Central Drainage in the PIA. Risk from total exposure to U may exist at upper, middle and lower Blue Creek AOIs.

Soil Invertebrate Feeding Mammal Community

The masked shrew was used for modeling risk to the soil invertebrate feeding mammal communities utilizing the terrestrial systems within the MA and PIA. Model-calculated risk to the soil invertebrate feeding mammal community was determined from abiotic exposure to As, Mn, Mo, Se, U, and V in the MA; and to As, U, and V in the East Haul Roads; U and V in the West Haul Road; and to V at the Northeast PIA and Southwest PIA. When the dietary component incorporating the maximum BAF values for earthworms was applied in the modeling, risk was predicted from most of the COPCs.

Insectivorous Avian Community

The cliff swallow was used for modeling dietary exposure risk to the insectivorous avian communities utilizing the terrestrial systems within the MA and PIA. Abiotic exposure of soil and surface water did not pose risk to the insectivorous avian community. There was model-calculated risk to insectivorous birds from total exposure to Cu at the AOIs within the MA and PIA. Risk from exposure of Cd, Cr, Pb, and Zn in the dietary component may exist within the MA and each of the AOIs within the PIA, plus Se may impose risk within the MA.

Omnivorous Avian Community

The song sparrow and mallard duck were used for modeling dietary exposure risk to the omnivorous avian communities utilizing the terrestrial and aquatic areas within the MA and PIA. When the song sparrow was modeled for the terrestrial areas, risk to the omnivorous avian community was predicted for Se in the MA. When the mallard was modeled for the aquatic areas, risk to the omnivorous avian community was predicted from Cu at the PCP within the MA and from Se in the Lower Eastern Drainage.

Risk to the omnivorous avian community at the terrestrial systems may exist from abiotic exposure of Cr in the MA and from total exposure of Zn at all terrestrial AOIs in the MA and PIA when the song sparrow was used for the modeling. Risk to omnivorous birds for the aquatic systems may exist from As, Cd, Ni, U and Zn, primarily at the PCP within the MA and As, Cd, Mn, Se, U, and Zn at various AOIs within the PIA.

Soil Invertebrate Feeding Avian Community

The American robin and the Wilson's snipe were used for modeling dietary exposure risk to the soil invertebrate feeding avian communities utilizing the terrestrial, aquatic, and riparian areas at this site. When the American robin was modeled for the terrestrial areas, risk from abiotic exposure to the soil invertebrate feeding avian community was determined for Se in the MA. When the dietary component using maximum earthworm BAF values for the American robin was applied, risk to the soil invertebrate feeding birds was driven by predicted COPC concentrations for As, Cd, Cr, Cu, Pb, Se, and Zn in the MA and PIA.

When the Wilson's snipe for the aquatic and riparian areas, risk from abiotic exposure to the soil invertebrate feeding avian community was determined for Cu and Ni in the PCP within the MA and Se at the Lower Eastern Drainage within the PIA. When the dietary component using the site-specific aquatic invertebrate tissue for the Wilson's snipe was applied, risk to the soil invertebrate feeding birds was driven by Cd and Se in the Lower Eastern Drainage and Se in the Upper Eastern Drainage.

Risk to the soil invertebrate avian community at the terrestrial systems may exist from total exposure of Mo and Tl in the MA when the American robin was used for the modeling. Risk to soil invertebrate feeding birds for the aquatic and riparian systems may exist from As, Cd, U, and Zn at some of the AOIs within the MA and PIA

Carnivorous Avian Community

The great horned owl and the American kestrel were used for modeling dietary exposure risk to the carnivorous avian communities utilizing the terrestrial systems within the MA and PIA. When either species was modeled, risk from abiotic exposure to carnivorous birds was determined from Se in the MA. There was model calculated risk to carnivorous birds from total exposure to Cd, Cr, Pb, Se, and Zn in the MA and Cd in the Northeast PIA, East Haul Road, and West Haul Road. The predicted risk to the carnivorous birds was driven by estimated COPC concentrations defined by the maximum BAF values in small mammals.

Risk to the carnivorous avian community may exist within the MA from abiotic exposure to As, Cr, Pb, and Zn, and from total exposure to As, Cd, Pb, Se, and Zn. Risk to the carnivorous avian community may exist from total exposure to Cd, Cr, Pb, and Zn at the AOIs within the PIA.

Piscivorous Avian Community

The great blue heron and the bald eagle were used for modeling risk to the piscivorous avian communities utilizing the aquatic systems within the MA and PIA. (Note: a limited database on fish BAFs restricted the modeling to three COPCs - Cd, Ni, and U for the total exposure). Risk to piscivorous birds may exist from exposure to U in the MA. No risk to piscivorous birds were indicated within the PIA.

Herbivorous Avian Community

The spruce grouse and the song sparrow were used for modeling risk to the herbivorous avian communities utilizing the terrestrial systems within the MA and PIA. Abiotic exposure of Se in the MA imposes risk to the herbivorous avian community. Possible risk to herbivorous birds may exist from exposure to Cr, Pb, or Zn in the MA and from Zn at all terrestrial AOIs in the PIA.

Riparian / Wetland Ecosystems

The riparian and wetland habitats have been grouped together for the ecological characterization of this project area. The riparian and /or wetland habitats in the PIA include the banks and the low lying areas bordering the Eastern, Central, and Western Drainages, and Blue Creek. No natural riparian/ wetland habitats were identified in the MA.

Amphibian Community

Risk to the amphibian community was based on COPCs for which toxicity reference values (TRV) were available. Measured concentrations of metals in surface water and sediments were compared to the amphibian TRVs.

Copper and Zn in surface water posed a risk to amphibians at all of the AOIs. Risk from Al and Cd may exist at all of the AOI in the MA and PIA. Chromium and Pb did not pose a risk to amphibians at any of the AOIs. Exposure to Cd and Zn in sediments posed risk to the amphibians at all of the AOIs.

Wetland Plant Community

Risk to the wetland plant community from the site-related contaminants exists within the PIA. Contaminant levels in the sediments were above the literature-based BM values for terrestrial plants. Chromium, Mn, Ni, U, and V exceeded plant BM values at all AOIs. Arsenic, Ba, Cd, Co, Se, and Zn exceeded plant BM values at some locations. Two COPCs exceeded the BM values at only one location: Cu, in Pit 3; and Tl, in Pit 4.

Wetland Invertebrates

Risk to the wetland invertebrates from site-related contaminants exists within the PIA. Contaminant levels in the sediments were above the conservative BM values for sediments. Measured concentrations of Sb, Mn, Ni, Se, and U exceeded sediment invertebrate BM values at all AOIs in the MA and PIA. Arsenic, Ba, Be, Cd, Co, and Zn exceeded sediment invertebrate BM at some locations. Two COPCs exceeded the sediment BM at only one location: Cu, in Pit 3; and Ag, in the Upper East Drainage.

<u>Total Ionizing Radiation</u>

Risk from TIR was evaluated following U.S. DOE (2002) guidance to aquatic biota, riparian animals, terrestrial animals and plants. Modeling for TIR within the BERA was based on central tendency concentrations providing the following assessments:

Aquatic Animal Populations

The TIR exposure to aquatic systems was calculated using the sum-of-the-fractions approach based on central tendency concentrations of the site-specific isotopes in instream sediments plus surface water. Pit 3, Pit 4, the PCP, and the Blood Pool exceeded the TIR criterion of 1 rad/day for the protection of aquatic animals. Surface water TIR exposures drive the risk with elevated TIR at each of these AOIs. Only the Outfall Pond had TIR of less than 1 rad/day.

The Central and Northeastern Drainages exceeded 1 rad/day. Surface water TIR drives the risk with elevated TIR at these two AOIs. The Western, Upper Eastern, and Lower Eastern Drainages, Upper Blue Creek, Middle Blue Creek, Lower Blue Creek, and Franklin D. Roosevelt (FDR) Lake, had TIR less than 1 rad/day, indicating no TIR risk to aquatic animals.

Riparian Animal Populations

The TIR exposure to riparian systems was calculated using the sum-of-the-fractions approach based on central tendency concentrations of the site-specific isotopes in riparian sediments plus surface water. Only the Central Drainage exceeded the TIR criteria of 0.1 rad/day for the protection of riparian animals.

Terrestrial Plant and Animal Populations

All AOIs in the MA and PIA had TIR exposures of less than 0.1 rad/day for terrestrial animals and less than 1.0 rad/day for terrestrial plants indicating no TIR risk to terrestrial plant and animal populations.

Overall Risk Summary

This ERA was conducted following Superfund guidance (EPA 1997) utilizing a systematic approach for selecting hazard and exposure parameters. The intent of this systematic process was to reduce the likelihood that risks would be underestimated, but still provide a level of understanding to allow informed management decisions. For this ERA, total exposure for estimating risk of the metals and radionuclides in the surface water, sediments and soils for each assessment endpoint was inclusive of natural background levels and was not subtracted from the total measured concentrations of the environmental media. Subsequently, naturally occurring levels of some of the metals and radionuclides were calculated to predict risk using this methodology.

The Midnite Mine site is an inactive uranium mineral mine, in a mineral-rich area and so high concentrations of metals and radionuclides were expected in all excavated areas (MA), all areas covered with waste rock (Haul Roads), and all areas within the direct influence of surface water or groundwater runoff (PIA drainages). Risk to the three ecosystems - aquatic, riparian/wetland, and terrestrial - within the MA and PIA are summarized as follows:

Aquatic Ecosystems

-High number of COPCs were identified within the aquatic habitats of the MA and the potentially impacted area (PIA).While none of the COPCs could be eliminated, those mine-related COPCs which were more pervasive, and of higher magnitude stand out (U, Al, Be, Cd, Co, Cu, Mn, Ni, Pb, Se, Ag, and Zn).

- Lacustrine habitats within the MA posed the greatest risk to aquatic communities based on the magnitude of the HQs, particularly at Pit 3, PCP, and Blood Pool. In addition, the poor water quality conditions (e.g., low pH, high sulfate, and high conductivity) would further impose significant risk to support aquatic life in these habitats.

- The utilization of the lacustrine habitats within the MA poses risk to wildlife (e.g., elk, deer, etc.) for watering and the consumption of mineral salts around the perimeter of these habitats and should be considered attractive nuisances to wildlife.

- The drainages within the PIA pose risk to the viability and function of aquatic communities based on in-place contamination of metals. In addition, the intermittent and/or low flow conditions along with the poor water quality conditions (e.g. low pH, high sulfate, and high conductivity) would further pose significant risk to support aquatic life within the drainages. The drainages continue to be a conduit for the transport of contaminants from the MA to Blue Creek.

- The onsite WTF, which operates from Spring to Fall, serves to significantly reduce the transport of contaminants from the MA to the drainages and Blue Creek. When the WTF is not operating from Fall to Winter, higher concentrations of contaminants from the MA are observed flowing to the drainages and Blue Creek.

- Blue Creek below the confluence of the Eastern Drainage is at risk from the mine drainage. There is a level of uncertainty on the causative agents imposing risk to the aquatic communities in Blue Creek including contamination of metals and TIR, as well as risk associated with reduced water quality conditions (e.g., high sulfate, high hardness, high conductivity).

- Risk to aquatic animal populations associated with TIR were found in the lacustrine habitat within the MA and in the Central and Northeastern Drainages based on exposure defined by central tendency concentrations.

Terrestrial Ecosystems

- The MA, characterized as a physically disturbed area, provides limited and poor quality habitat for wildlife. Some species of wildlife (e.g., marmot, cliff swallow) that have been reported to inhabit the MA are at risk. Wildlife that would utilize the MA for water, grazing, or salt consumption are at risk. The East and West Haul Roads which were constructed and paved with gravel and waste rock from the MA presents a significant source of contamination within the PIA

- Model calculated risk to the mammalian communities based on conservative food chain modeling was determined for herbivorous mammals, carnivorous mammals, omnivorous mammals, piscivorous mammals, and soil invertebrate feeding mammals. In general, the greatest predicted risk to the mammalian communities, particularly the herbivorous mammals, carnivorous mammals, omnivorous mammals, and soil invertebrate feeding mammals was determined within the MA. A higher number of COPCs was predicted to pose risk to these mammalian communities within the MA than at AOIs within the PIA.

For the AOIs within the PIA, a similar number of COPCs was predicted to pose risk between the Northeast and Southwest PIAs and the East and West Haul Roads to herbivorous mammals based on abiotic exposure, to the carnivorous mammals based on total exposure (i.e., dietary component plus abiotic exposure) , to omnivorous mammals based on abiotic and total exposures, and to soil invertebrate feeding mammals based on abiotic exposure. Numerous COPCs were predicted to impose risk within both the MA and PIA when total exposure was modeled for the herbivorous mammal and soil invertebrate feeding mammal communities. For the herbivorous mammals, risk was driven by plant tissue. For the soil invertebrate feeding mammals, risk was driven by the earthworm BAF.

Risk to the piscivorous mammal community was limited to abiotic exposure of one COPC (U) within the MA and from abiotic exposure of one COPC (Mn) at Middle Blue Creek. When fish BAF values were applied to the models, a higher number of COPCs were predicted to pose risk at the AOIs within the MA than the PIA.

- Model calculated risk to the avian communities based on conservative food chain modeling was determined for insectivorous birds, omnivorous birds, soil invertebrate feeding birds, carnivorous birds, piscivorous birds, and herbivorous birds. In comparison to the mammalian communities, the avian communities had fewer number of COPCs that were predicted to pose risk within the MA and PIA. The greatest predicted risk to some of the avian communities, particularly the omnivorous birds, the soil invertebrate feeding birds, and herbivorous mammals was determined within the MA. A higher number of COPCs was predicted to pose risk to these avian communities within the MA than at AOIs within the PIA.

For omnivorous and herbivorous birds, four COPCs were predicted to pose risk within the MA and one COPC within the PIA. For both the soil invertebrate feeding birds and carnivorous birds, only one COPC (Se) was predicted to impose risk from abiotic exposure within the MA while a higher number of COPCs was predicted to pose risk from total exposure, driven either by the earthworm BAF values for the soil invertebrate feeding birds or the small mammal BAF values for the carnivorous birds. For the insectivorous avian community no risk was determined based on abiotic exposure. When total exposure was modeled for the insectivorous birds, five COPCs were predicted to be at risk within the MA and the AOIs of the PIA. Risk to the piscivorous avian community was limited to abiotic exposure of one COPC (U) at Pit 3 and the PCP within the MA. No other risk was predicted within the MA and PIA to the piscivorous birds.

- Risk to the soil microorganisms and terrestrial plant communities was the greatest within the MA having the highest number of COPCs present and the highest magnitude of HQs. Within the PIA, the East and West Haul Roads had a higher number of COPCs than the Northeast PIA and the Southwest PIA for both the ERA of the soil microorganisms and the terrestrial plant communities.

- An evaluation of risk to threatened and endangered (T&E) species was and/or can be largely accomplished indirectly within this ERA. Although determination of “injury” to T&E species is not within the jurisdiction of the EPA, it is recognized that T&E species are part of the environment to be evaluated with a BERA. Subsequently, risk to present or potential T&E species can be indirectly determined or implied within the selections of the species models and input parameters for assessment endpoints that would be appropriate to the T&E species. For example, in this ERA, the bald eagle was used as a receptor for assessing risk to piscivorous birds. Likewise, if wolves were to move back into the project area, the coyote, which was one of the receptors used for carnivorous mammal community, could be aligned with the wolf as a surrogate species for characterizing risk to carnivorous mammals.

- No risk to terrestrial plant and animal populations associated with TIR were found in the MA or PIA based on exposure defined by central tendency concentrations. There is uncertainty associated with the animal exposure screening, because one potentially significant contributor to exposure to some wildlife that was not included in this study was the mineral salt deposits found around the perimeter of water bodies in the MA.

Riparian/Wetland Ecosystems

- The six riparian/ wetland AOIs within the PIA pose risk to the amphibian, wetland plant and invertebrate communities based on the high number of COPCs present. The drainages including Central, Upper Eastern, and Lower Eastern Drainages along with Middle Blue Creek tended to have ten or more COPCs present. Upper Blue Creek and Lower Blue Creek had the fewest COPCs present.

- Risk to riparian animal populations associated with TIR were only found in the Central Drainage based on exposure defined by central tendency concentrations.

In summation, the MA is characterized by a higher level of predicted risk to most of the assessment endpoints based on an increased number of COPCs along with HQs that tended to be at higher magnitude than within the PIA. The PIA areas adjacent to the MA and the downstream areas within the PIA tended to be characterized with lower number of COPCs and with HQs at lower magnitide than within the MA. While the MA is a physically disturbed area with limited and poor quality habitat for wildlife, there is evidence of utilization by wildlife. In addition, the lacustrine habitats within the MA appears to present attractive nuisances to wildlife. The East and West Haul Roads, constructed and paved with gravel and waste rock from the MA, present a significant source of contamination within the PIA. Further dispersion of contaminants from these haul roads to adjacent areas is anticipated from these roads.

Within the aquatic systems there is a general trend of fewer COPCs in a downstream direction from the MA to the PIA. The onsite WTF and the seep collection system serve to significantly reduce the metal loading from the MA to the drainages and Blue Creek. Higher loading of contaminants to these aquatic systems would occur in the absence of seep collection and water treatment. Blue Creek below the confluence of the Eastern Drainage is at risk from the mine drainage.

Section 10 of this document initiates the risk management process that serves to identify contaminants in surface water, sediments, and soil which contribute the most risk, identified as the risk drivers, and develops preliminary remediation goals (PRGs) for these contaminants that would provide ecological protection. Risk-based PRGs were derived based on the most sensitive assessment endpoint defined within the BERA. The risk-based PRGs were then compared to ecological derived Applicable or Relevant and Appropriate Requirements (ARARs) and to background conditions. In some cases, the risk-based PRGs are lower than ARAR's, because the risk-based PRGs are based on conservative assumptions. In cases where an ARAR based PRG or a risk based PRG would be less than background, EPA relies upon background to establish the PRG.

1.0 INTRODUCTION

The purpose of this work assignment (WA) was to generate an Ecological Risk Assessment (ERA) for the aquatic, riparian/wetland, and terrestrial components of the Midnite Mine Site utilizing a database of analytical data (e.g., soils, surface water, instream and riparian sediments, and biota). This WA includes the generation of site-specific aquatic studies.

The study presented in this document reflects modifications of the Aquatic Ecological Risk Screening for the Midnite Mine Remedial Investigation/Feasibility Study (RI/FS) (URS 2001a) and the Terrestrial Ecological Risk Assessment Approach for Midnite Mine RI/FS (URS 2001b) by the URS Corporation (URS 2000a). Modifications of this ERA further evolved from interactions with the Biological Technical Assistance Group (BTAG) for the Midnite Mine site. Appendix A presents the responses to three memoranda from the Spokane Tribe of Indians (STI) and the United States Fish and Wildlife Service (U.S. FWS) related to various issues on the conduct of this ERA.

This document presents the screening level ecological risk assessment (SLERA) and the baseline ecological risk assessment (BERA) encompassing Steps 1 through 7 of the eight-step United States Environmental Protection Agency (EPA) ERA guidance for Superfund (U.S. EPA 1997).

1.1 Site Setting and Description

Midnite Mine is an inactive open pit uranium mine located on the Spokane Indian Reservation in Stevens County, Washington. Wellpinit, the nearest town, is approximately eight miles southeast of the site. Mining activities, conducted by Dawn Mining Company (DMC) between 1955 and 1981, resulted in releases of radionuclides and other metals from the mining of ore. No milling or processing of the uranium occurred at this site. The Midnite Mine Superfund Site was added to the National Priorities List (NPL) in May 2000.

The Midnite Mine Superfund Site (Figures 1 and 2) is situated on the south-facing slope of Spokane Mountain at elevations ranging from approximately 2,400 to 3,400 feet above sea level. The site is within the watershed of Blue Creek, which flows into Franklin D. Roosevelt (FDR)Lake about three miles downstream of the site (URS 2002).

Over the course of mining operations, an area approximately 0.5 miles wide by one mile long was developed. During mining, several pits and subpits were excavated. Overburden and waste rock were used to backfill some of the pits and altered the surface terrain, filling portions of the natural drainages in the area and creating several large piles (URS 2002).

The site area has been defined as the Mined Area (MA) and the Potentially Impacted Area (PIA). The MA is the approximately 343-acre area where the ground surface has been visibly disturbed by mining operations. The PIA includes areas near the MA, including downstream drainages and downwind areas that may have been affected by mining activities. Two haul roads in the PIA that lead up to the MA were constructed with protore from the mine. Distinguishing between the MA and PIA aids in clarifying the different habitats and their uses along with the associated exposures and exposure point concentrations.

1.1.1 Mined Area

Features of the MA are shown on Figures 2 and 3. Two large mining pits (Pit 3 and Pit 4) remain open and are partially filled with water. Approximately 2.5 million tons of ore/protore, and 33 million tons of waste rock are estimated to remain on site (SMI 1999a; USEPA 1998). Waste rock from mining activities covers an extensive area, and discrete waste rock, ore and protore stockpiles are distributed across the MA. Two backfilled pits are present west of Pit 3. Other features include buildings associated with past mining, facilities associated with an active water management system, and a network of roads in the MA (URS 2002).

Discrete waste rock piles include the South Spoils, Hillside Dump, and Area 5 (Figure 3). To minimize erosion, DMC placed an eight-inch soil cover on the South Spoils and seeded it in 1980. Water management facilities include a surface impoundment for collection of seep water (Pollution Control Pond [PCP]), a system of seep collection sumps and weirs, several buildings containing pump equipment and holding tanks for collected seep water, and a water treatment facility (WTF) which discharges treated pit water and seep water. This outfall is permitted via a National Pollutant Discharge Elimination System (NPDES) permit to the Eastern Drainage (URS 2002).

A small pond called the Blood Pool is located east of the water treatment plant (Figure 3). The pond is fed by seeps and is dry much of the year, but when filled can reach approximately three feet deep. Overflow from the Blood Pool drains into a ditch and is partially collected in a sump located downhill of the pool. This water is periodically pumped to Pit 3. Sampling conducted by U.S. EPA Region X (1998) and Shepherd Miller, Inc. (SMI) in 1998 and 1999 (SMI 1999a) indicate that the water contains elevated concentrations of radionuclides. Water levels in the open pits vary seasonally. Pit 3 contains water from precipitation, groundwater flow, water pumped from the seep collection points, and water pumped from the backfilled pits. Pit 4 receives water from precipitation and groundwater (URS 2002).

Following cessation of mining, the water level in Pit 3 rose steadily, necessitating the construction of a water treatment system. Evaporation and the seasonal operation of the WTF since 1992 have lowered water levels in both pits. Surface water controls at the site include diversion ditches and drains that transport water away from the open pits and some waste rock areas. However, most surface water in the MA infiltrates the underlying unconsolidated material and becomes groundwater (URS 2002).

Groundwater flows through unconsolidated materials and bedrock in the MA, generally traveling from north to south following the topography and converging toward surface water drainage pathways. Unconsolidated materials consist of alluvium, waste rock, and ore/protore stockpiles. Within the bedrock, groundwater flow is through discrete fractures, joints, and faults. Recharge to the shallow groundwater system in the MA occurs from infiltration of precipitation (including snow). The majority of the groundwater moves through the waste rock and alluvium and flows across the surface of the bedrock. During its passage through the different types of rock, water may react with minerals in the rock that contribute radionuclides, metals, and major ions such as sulfate (SO_4) to the groundwater. Much of this shallow groundwater discharges at the three major seep areas at the toe of the South Spoils waste rock pile. Shallow groundwater that does not emerge at the seeps and all of the groundwater in the deeper bedrock system continues to flow southward into the PIA (URS 2002).

The physically disturbed upland areas of the MA provide limited and poor quality habitat for wildlife, whereas the PIA and surrounding areas are largely undeveloped forest land used by diverse wildlife. The MA presents an attraction to wildlife for watering and consuming the salts deposited around the perimeter of the lacustrine habitats. Field observations have witnessed elk and deer at Pit 3. In addition, the MA offers habitat that attracts certain types of wildlife including marmots and cliff swallows.

Small areas of coniferous forest remain on apparently undisturbed ground in the MA. Predominant plant species vary in upland areas, but include grasses, clovers, knapweed, arrowleaf, balsamroot, common snowberry, and ponderosa pine. Other species identified by SMI (1999b) as major plant species for upland areas include Douglas fir, Macoun rose, autumn willowherb, Idaho fescue, Prush deervetch, groundsel, and mullein (URS 2000).

1.1.2 Potentially Impacted Area

The PIA includes those areas affected by aerial deposition of materials from the MA; surface water, sediments, and riparian areas in drainages that may be affected by seeps, runoff or groundwater flow from the MA; and potentially affected groundwater outside the MA (Figure 1 and 2). The PIA is grouped into subareas designated as Upland PIA (Northeast and Southwest), Haul Roads, Drainages, and Blue Creek.

1.1.2.1 Upland

The Upland PIA is largely undisturbed by mining activities and is dominated by an overstory of either ponderosa pine or a mixture of ponderosa pine and Douglas fir. A variety of sub-habitat types also occur in the Upland PIA, including grassland, open, and steep sub-habitats. Factors such as aspect, slope, elevation, and soil characteristics influence the distribution and diversity of the upland areas. Steep habitat occurs on the west bank of the middle and lower portions of Blue Creek and open habitat is found on the western bank of the lower portion of Blue Creek (URS 2000).

1.1.2.2 Haul Roads

Several unpaved roads run through the PIA. The roads are surfaced with gravel believed to originate from the protore stockpile located near the waste treatment plant. These haul roads may be impacted as a result of the materials used in their construction. In addition, materials lost from haul trucks and dust or runoff from the roads may have affected areas adjacent to the roads (URS 2000).

The East and West Haul Roads link the MA to the paved Ford-Wellpinit Road (Figure 2). The East Haul Road was the main haul road to the Dawn Mill in Ford, Washington during the later stages of mining. It is currently used to haul sludge from the WTF to the Ford Mill twice daily when the system is operating. The West Haul Road was used during early mining operations and is currently used for access to the site area by DMC workers. Three pump house access roads extend from the PCP to the Western and Central drainage seep pump houses. These roads were never used for hauling and are currently used mostly for access to the pump houses (URS 2000).

1.1.2.3 Drainages

Runoff from the MA enters seven drainages: Western Drainage, Central Drainage, Eastern Drainage, Northeastern Drainage, Northern Drainage, Far West Drainage, and Southwestern Drainage (Figure 2). The Eastern Drainage receives flow from the Northeastern Drainage and, south of the site, from the Western and Central Drainages before entering Blue Creek. All the other PIA drainages also flow into Blue Creek except the Far Western Drainage, which flows westward.

Along its route, Blue Creek receives water from a number of other tributary drainages. The Western Drainage, Central Drainage, and Eastern Drainage are likely pathways for contaminant exposure. These drainages once originated in the MA, but the upper portions are now buried under waste rock. The remaining portions are south of the MA, downgradient from seeps emerging from MA waste rock piles. In addition, groundwater flowing from the MA seasonally enters gaining reaches of these drainages. The Northern and Far West Drainages receive runoff from relatively small areas of the MA and receive flow from areas outside the PIA and MA.

Vegetation in the drainages is relatively dense, particularly in drainages with continuous flow. Cover types range from riparian vegetation in moister areas to Ponderosa pine and pine/fir. Aquatic vegetation varies depending on stream characteristics, and ranges from algae and mosses to sedges and cattails (URS 2000).

1.1.2.4 Blue Creek

Blue Creek originates at Turtle Lake and flows southwest approximately 6.7 miles to the Spokane Arm of FDR Lake, approximately 3 miles from the East Drainage confluence (Figures 1 and 2). Blue Creek drainage has a surface area of 19.6 square miles. Streambed elevation ranges from 748 meters (m) at Turtle Lake to 393 m at the Spokane Arm, yielding an average drop in elevation of 33 meters per kilometer (m/km). Oyachen Creek converges with Blue Creek approximately 1.5 miles downstream of the confluence of Blue Creek and the Eastern Drainage. Oyachen Creek often dries up during summer and early fall depending on seasonal precipitation. During low flow periods Blue Creek flows below the ground between Oyachen Creek and FDR Lake. During these low flow periods it is unknown whether there is sufficient water to cover the bottom substrate of the streambed and the water is flowing undetected through the hyporheic zone, or if there is a portion of the stream discharge that actually flows underground from Oyachen Creek to the Spokane Arm (URS 2000; Doughtie *et al.* 1993).

1.2 Overview of Ecological Risk Assessment Process

Ecological Risk Assessments are used to evaluate the likelihood of adverse ecological effects occurring as a result of exposure to environmental stressors (defined as any physical, chemical, or biological entities that can induce adverse responses at a site). The goal of the ERA is to provide information that will assist risk managers to make informed decisions regarding releases of hazardous substances. The specific objectives of the process are: (1) to identify and characterize the current and potential threats to natural resources from a hazardous substance release; and (2) to identify cleanup levels that would protect those natural resources.

An ERA evaluates the potential adverse effects of human activities on the organisms that make up ecosystems. ERAs involve developing exposure profiles to identify ecological receptors (tissues, organisms, populations, general trophic levels, communities, or ecosystems), habitats, and pathways of exposure. The ERA process can be used to identify vulnerable and valued resources, prioritize data collection activities, and link human activities to their potential effects. ERAs also provide a basis for comparing different management options, enabling better informed decisions about the management of ecological resources.

The ERA framework consists of three phases: problem formulation, analysis, and risk characterization (USEPA 1998b). Problem formulation involves identifying goals and assessment endpoints, preparing a conceptual model, and developing an analysis plan. An assessment endpoint is a species, ecological resource, or habitat type that is to be protected, and which is used to guide the development of the study design at the site. The conceptual model describes the ecosystem or ecosystem components at risk, presents a series of working hypotheses about how exposure to contaminants might affect the ecological components of an environment, and details the relationships between measures of effects (changes in attributes of assessment endpoints as a response to the stressors to which they are exposed) and exposure scenarios. The analysis plan specifies the data required to evaluate impacts to the assessment endpoints and the methods that will be used to analyze the data.

The analysis phase involves the creation of life-history and toxicity profiles for estimating and characterizing the exposure of ecological receptors to stressors, and establishing the relationships between stressor levels and ecological effects. Risk characterization is the process of estimating risk through the integration of exposure and stressor-response profiles, and providing the information necessary for interpreting risk estimates. The risk manager can then integrate the risk assessment results with other considerations (e.g., background levels of contamination, available cleanup technologies, and costs of alternative actions and remedy selections) to make and justify risk management decisions.

The ERA guidance of the Superfund Program (USEPA 1997) is formatted to follow an eight-step process consistent with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidelines (USEPA 1998b) and is summarized, as follows:

Step 1: Screening Level Problem Formulation and Ecological Effects Evaluation

Includes developing descriptions of: the environmental setting (habitat types, observed species, species likely to be present based on habitat types documented, and threatened, rare, and endangered species); contaminants known or suspected to exist at the site and the maximum concentrations present in each medium; contaminant fate and transport mechanisms that might exist; mechanisms of ecotoxicity associated with contaminants and categories of receptors that may be affected; complete exposure pathways that might exist; and screening ecotoxicity values equivalent to chronic No Observable Adverse Effects Levels (NOAELs) based on conservative assumptions.

Step 2: Screening Level Preliminary Exposure Estimate and Risk Calculations

Involves estimating risk by comparing maximum documented exposure concentrations with the ecotoxicity screening values developed in Step 1. Based on the outcome, the risk manager will decide either that the SLERA is adequate to determine that ecological threats are negligible, or that the process should continue to the more detailed BERA outlined in steps 3 through 7 below.

Step 3: Baseline Risk Assessment Problem Formulation

The results of the screening assessment are used in conjunction with site-specific information to determine the scope and goals of the BERA. This step involves the selection of assessment endpoints, refining the list of contaminants of concern, the characterization of ecological effects of contaminants, and information about exposure pathways and contaminant fate and transport. A conceptual model, which includes working hypotheses and risk questions that will be addressed in the investigation, is initiated.

Step 4: Study Design and Data Quality Objective Process

The conceptual model initiated in Step 3 is completed by developing measurable attributes that will be employed to quantify and predict change of the assessment endpoints and the conceptual model. The conceptual model is then used to develop the study design and data quality objectives, which are presented in the Work Plan (WP) and Sampling and Analysis Plan (SAP). The WP documents the decisions and evaluations made during problem formulation and identifies additional research tasks needed to fully evaluate the risks to ecological resources. The SAP provides a detailed description of sampling and data-gathering procedures, as well as a description of the steps required to achieve the study objectives.

Step 5: Verification of Field Sampling Design

The hypotheses, sampling plan, exposure pathways, and measurement endpoints are evaluated to verify that the SAP is appropriate for the site.

Step 6: Site Investigation and Data Analysis

Information collected from the site is used to characterize exposures and ecological effects. Both the site investigation and data analysis should be conducted according to the WP and SAP developed in Step 4.

Step 7: Risk Characterization

Risk characterization integrates the data on exposure and effects, which includes risk estimation (integrating exposure profiles with the exposure-effects information and summarizing the associated uncertainties) and risk description (providing information needed to interpret the risk results and identifying a threshold for adverse effects on the assessment endpoints).

Step 8: Risk Management

Risk management follows the completion of the ERA process. The risk manager integrates the ERA results with other considerations (including background levels of contamination, available cleanup technologies, and costs of alternative actions and remedy selections) to make and justify risk management decisions.

2.0 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

2.1 Overview of Screening Level Ecological Risk Assessment Process

The SLERA process presented in this section incorporates Steps 1 and 2 of the ERA guidance of the Superfund Program (EPA 1997) and the general screening guidance of the United States Department of Energy (U.S. DOE) for evaluating total ionizing radiation exposures (TIR) to aquatic, riparian, and terrestrial biota (U.S. DOE 2002). This SLERA assesses the risk of metals and radionuclides that may be associated with the mining operations in the Midnite Mine Site to aquatic, riparian, and terrestrial ecosystems.

Step 1 of the ERA guidance includes the screening level problem formulation process and the ecological effects evaluation. The problem formulation phase (Section 2.2) describes the ecosystems at risk in the MA and the PIA, the known and suspected contaminants in these areas, the potential fate and transport of the contaminants, the likely categories of receptors that could be affected based on potential exposure pathways, and the selection of assessment endpoints that will be used to screen for ecological risk. An initial tier of assessment endpoints was selected for the SLERA encompassing the three ecosystems – aquatic, riparian, and terrestrial – at risk. Each assessment endpoint is accompanied with an overall risk question and the measurable attributes used to quantify and predict changes to the assessment endpoint.

The ecological effects evaluation involves the selection process for defining the ecological screening benchmarks (BM) that will be used to evaluate the ecological effects of the metals present in surface waters, sediments, and soils. The BM values are concentrations of chemicals that are considered to be at the highest acceptable concentration, at or below which there should be no adverse environmental effects.

Step 2 of the guidance estimates the exposure levels and screens for ecological risk. The exposure estimations were based on conservative assumptions to ensure that potential ecological threats were not missed. Only complete exposure pathways were evaluated. Exposures were based on the highest measured contaminant concentration for both metals and radionuclides for each environmental medium at each area of interest (AOI) in the MA and PIA. The process of screening to estimate ecological risk for each metal of interest is based on the hazard quotient (HQ) method. The HQ method compares the highest exposure concentrations (EC) relative to the BM values to estimate the risk of each contaminant in each AOI in the MA and PIA.

The risk from TIR of the radionuclides associated with the mining operations to aquatic biota, riparian animals, terrestrial animals, and terrestrial plants is evaluated following U.S. DOE guidance for general screening (U.S. DOE 2002). This methodology sums the total exposure of the radionuclides at maximum concentrations for each of the environmental media to derive the TIR exposure for each AOI. Each radionuclide is compared to a screening value, referred to as the biota concentration guide (BCG), for each environmental media to which the biota could potentially be exposed. The BCG screening values represent the limiting concentration for each radionuclide in an environmental medium (water, sediments, or soil) that would not exceed the recommended dose for that specific group of biota.

The risk characterization phase of this SLERA (Section 2.4) incorporates the risk estimation and risk description. The risk estimation provides the quantitative assessments from the HQs and the TIR calculations for each environmental matrix – surface water, instream sediments, riparian sediments, and soils. The risk description section delineates the risk being imposed to the three ecosystems (aquatic, riparian, and terrestrial) based on the contaminants of potential concern (COPC) being retained for the BERA and identifies the AOIs and the assessment endpoints at risk. Section 2.5 provides the assumptions utilized and Section 2.6 provides the conclusions. The BERA begins in Section 3.

2.2 Problem Formulation of the Screening Level Ecological Risk Assessment

The problem formulation for this SLERA contains overviews of the ecosystems at risk, potential fate and transport of contaminants, the initial tier of assessment endpoints selected for the SLERA, the overall risk question and measurable attributes for each assessment endpoint, and the exposure pathways.

2.2.1 Ecosystems at Risk

The physical setting and description of the site was provided in Section 1.1. The four habitat types identified on the site include upland habitat, riparian and wetland habitat, riverine habitat, and lacustrine habitat. Characterizations of the ecological habitats and biota of the site have been presented in the Technical Memorandum, *Ecological Characterization of Midnite Mine* (URS 2000). An overview of the aquatic, riparian, and terrestrial ecosystems is provided below:

2.2.1.1 Characterization of the Aquatic Ecosystems

The aquatic ecosystems at the site include lacustrine habitats in the MA and riverine habitats in the PIA (Figure 2). The lacustrine habitats in the MA include five open-water bodies – Pit 3, Pit 4, Pollution Control Pond (PCP), Outfall Pond, and Blood Pool. The riverine habitats in the PIA include the drainages and Blue Creek. Three principal drainages - Eastern, Central, and Western Drainages - flow south from the MA. The Central and Western Drainages join the Eastern Drainage that flows into Blue Creek. The Eastern Drainage also receives the outfall from the water treatment facility. Other minor intermittent drainages in the PIA include Far Western, Southwestern, Northeastern, and Northern drainages. All these drainages, except the Far Western Drainage, ultimately drain into Blue Creek. The Far Western Drainage flows directly into FDR Lake (URS 2000). All surface water bodies occurring on the STI Reservation are considered crucial resources by the STI (STI 1996, URS 2000).

Blue Creek is a perennial stream that flows 6.7 miles from Turtle Lake in a generally southwestern direction to the Spokane Arm of the FDR Lake. Two perennial streams – Eastern Drainage and Oyachen Creek – flow into Blue Creek. The Eastern Drainage, which contains acid mine wastes from Midnite Mine, flows into Blue Creek approximately 3.4 miles upstream of its confluence with the Spokane Arm. There are times when the flow of the Eastern Drainage is predominately based on the discharge of the water treatment plant that treats contaminated seep water from Midnite Mine. Oyachen Creek joins Blue Creek approximately 1.3 miles upstream of its confluence with the Spokane Arm of FDR Lake (URS 2000). Blue Creek is subdivided into three regions – upper, middle, and lower – designating where the sampling of water and sediments was conducted for this ERA (Figure 1). Upper Blue Creek is the reach above the confluence of the Eastern Drainage and Middle Blue Creek is the reach below the confluence of the Eastern Drainage. Lower Blue Creek is below the confluence of Oyachen Creek.

Biological studies of the lacustrine habitats in the MA and the drainages in the PIA are limited. However, biological studies exist for similar types of riverine and lacustrine habitats within the STI Reservation identifying the flora and fauna that could potentially exist if water quality and physical characteristics were comparable (Reid and Wood 1976, Stinson and Gilbert 1985, URS 2000).

During low flow periods Blue Creek flows below the ground between Oyachen Creek and the confluence of the Spokane Arm. During these low flow periods it is unknown whether there is sufficient water to cover the bottom substrate of the streambed and the water is flowing undetected through the hyporheic zone, or if there is a portion of the stream discharge that actually flows underground from Oyachen Creek to the Spokane Arm (URS 2000; Doughtie *et al.* 1993). The daily streamflow from 1985 to the present has been recorded at the United States Geological Survey (USGS) gaging station on Blue Creek just above the confluence with the Eastern Drainage. The lowest flow rates typically occur during the period between August and February discharging at a rate of approximately 0.2 to 0.3 cubic feet per second (cfs). The flow rates steadily increase from March to April resulting from snowmelt. March often records the highest flow rates with peak flow rates that often exceed 10 cfs. From April to August a steady decline of the flow rates occurs.

An instream study characterized three reaches of Blue Creek to determine habitat availability for rainbow trout in 1988 (Barber *et al.* 1988). For this study Blue Creek was divided into three segments. Within each segment a study reach was selected that best characterized the typical habitat for that segment. One study reach was located just above the confluence of the Eastern Drainage and Blue Creek while the second reach was located just downstream of the confluence of the Eastern Drainage and Blue creek. The third reach was located just downstream of the confluence of Oyachen Creek and Blue Creek. Qualitative assessment of substrate type, instream and overhead cover availability, the proportion of riffles, runs, and pools, channel shape and slope, and water depth and velocity were defined in each reach to provide habitat evaluation. It was determined that all three reaches of Blue Creek consisted primarily of riffle habitat, with interspersed shallow pools. The predominant bottom substrate for all three reaches was reported to be cobble with a size range of 64 to 128 millimeters (mm). Sediment grain sizes were reported being somewhat larger in the reach from the Eastern Drainage to Oyachen Creek. Both instream and overhead coverage were considered plentiful in Blue Creek (Barber *et al.* 1988; URS 2000).

A survey to map habitat in Blue Creek was conducted in 1991 to assess approaches that could be utilized to improve spawning habitat and adult fish habitat for rainbow trout (Peone *et al.* 1993). It was concluded that adult rainbow trout habitat and spawning habitat could be improved by creating pools to increase the pool-riffle ratio since adult rainbow trout tend to utilize pools in streams more extensively. In 1992, a series of 64 log weirs and 7 rock weirs were installed in Blue Creek between Oyachen Creek and FDR Lake. In 1993, a total of 3,000 trees including willows, cottonwood, aspen, and dogwood were planted in the riparian zone to increase overhead cover and improve bank stability (Peone *et al.* 1993; URS 2000).

2.2.1.2 Characterization of the Riparian and Wetland Ecosystems

The riparian and wetland habitats have been grouped together for the ecological characterization in this project area. Although these habitats constitute less than two percent of the surface area of the STI Reservation, they are considered important biologically productive and important wildlife habitats that provide food, cover, and travel routes for wildlife (URS 2000, Stinson and Gilbert 1985, Zamora 1983). All riparian and wetland habitats are considered crucial resources on the STI Reservation (STI 1996).

The banks and low lying areas bordering the Eastern, Central, and Western Drainages and Blue Creek are considered riparian and/or wetland habitats in the

PIA. The flora and fauna potentially present at the Midnite Mine site have been identified by URS (2000). An onsite wetland delineation of the Eastern Drainage characterized the vegetation as predominantly cattail, bulrush, and dogwood (E&E 1998, URS 2000). Plant surveys conducted by SMI (1999b) at six stations in the Western, Central and Eastern Drainages in 1999 provided a list of 18 woody species and 34 herbaceous species. Survey data on the wildlife utilizing the riparian and wetland habitats have not been found. Deer, rabbit, squirrel, ermine, flicker, turkey, and various birds have been observed along the drainages (URS 2000). Amphibians would also be expected to concentrate around these habitats and utilize it for breeding. Riparian habitats, characteristic of having high numbers of insects and high vegetation productivity, would be expected to be extensively utilized by small mammals (e.g., shrews, voles, and mice) (URS 2000).

Riparian habitat along Blue Creek is confined to narrow bands along the stream banks. Wetland habitats may also occur in small isolated pockets along Blue Creek (e.g., beaver ponds). The riparian vegetation is defined as a "nearly impenetrable tangle of shrubs and herbs, dominated by the spiny, black hawthorn" (URS 2000). A survey of riparian vegetation was conducted at six sampling locations along Blue Creek including three stations upstream from the confluence of the Eastern Drainage and three stations below the confluence of the drainage. This survey provided a listing of the dominant woody and herbaceous species present (SMI 1999). Surveys of the wildlife using the riparian habitat were not available, but a number of sitings have been reported including bear, deer, elk, turkey, cougar, moose, gopher snakes, ruffed grouse, and beaver (URS 2000).

2.2.1.3 Characterization of the Terrestrial Ecosystems

The terrestrial ecosystems at the site are characterized by the physically disturbed habitat in the MA and a diversity of upland habitats throughout most of the PIA and Blue Creek corridor that are largely undisturbed by mining operations.

With the exception of a few small stands of coniferous forest in the MA, the upland habitat of the MA is of limited extent and poor quality for wildlife use. Some revegetation projects have occurred in several areas in the MA including the South Spoils area that was revegetated in 1981 and the revegetation plots at two ore/protore stockpiles in 1994 and 1995. Revegetation projects have been judged successful (URS 2000). Certain habitats in the MA, like the water sources (e.g., Pits 3 and 4) and the salt deposits, are believed to attract wildlife (e.g., deer and elk). Some animals (e.g., marmots, cliff swallows) have been observed inhabiting the MA. Pocket gopher diggings were observed in the remnant forest areas. Anecdotal reports also indicate that there are a number of animals (e.g., moose, coyote, bear, turkey) that have visited the MA by either direct observations or animal signs (e.g., scat and tracks) (URS 2000).

Coniferous forests dominate the upland habitats in the PIA. The forest cover types are dominated by either ponderosa pine (*Pinus ponderosa*) or a mixture of ponderosa pine and Douglas fir (*Pseudotsuga menziesii*). The types of forest plant communities in the project area have been previously described in URS (2000). Lists of the reptile and amphibian, mammal, and bird species that may utilize the upland habitat have been previously listed by URS (2000). The fauna that can be associated with ponderosa pine ecosystems have been characterized as having moderate vertebrate diversity and production for permanent residents, and as an important seasonal feeding area for many avian and mammal species. Approximately 190 species have been listed that can utilize ponderosa pine habitats (URS 2000, Stinson and Gilbert 1985).

2.2.2 Contaminants of Potential Concern

Site investigations conducted by Ecology & Environment during 1998 (E&E 1998), by Shepherd-Miller, Inc.(SMI) in 1999 (SMI 1999a, 1999b, 1999c), and by URS from 1999 to 2001 (URS 2000a, 2001a, 2001b) have compiled the COPC encompassing metals and radionuclides in surface waters, instream sediments, riparian sediments, and soils. These COPCs or analytes were considered based upon their potential to originate from the ore body or be associated with the mining operations.

2.2.3 Potential Fate and Transport of Contaminants

Conceptual models of fate and transport of contaminants are depicted in Figures 4 through 7 (adapted from URS 2001b). Figures 4 and 5 present the fate and transport of surface water, instream sediments, and riparian sediments in the MA and PIA. Figures 6 and 7 present fate and transport of soils within the MA and PIA.

2.2.4 Assessment Endpoints

Assessment endpoints are explicit expressions of the actual environmental value that is to be protected, operationally defined by an ecological entity and its attributes (USEPA 1998b). The criteria for selection of assessment endpoints include ecological relevance, susceptibility (exposure plus sensitivity), and relevance to management goals. An initial tier of nine assessment endpoints was selected for the SLERA that serve to encompass the three primary ecosystems – aquatic, riparian, and terrestrial – that are at risk at the site. More specific endpoints relevant to exposure to receptors and the ecosystems at risk will be provided in the BERA.

Each assessment endpoint is accompanied by an overall risk question and the measurable attributes. The measurable attributes include measures of exposure and measures of effects.

The assessment endpoints for the SLERA are grouped into the aquatic, riparian, and terrestrial ecosystems, as follows:

Aquatic Ecosystems

Assessment Endpoint #1: Function and Viability of the Aquatic Plant Community

Aquatic plants provide food and habitat for aquatic animals. Aquatic plant communities include algae (e.g., diatoms, filamentous algae) and macrophytes. The aquatic plant community was determined to be of concern due to its role in energy flow, providing habitat for aquatic animals, its potential for exposure to contaminants, and its role as a food source for higher trophic levels. The overall risk question and measurable attributes for this assessment endpoint are:

Overall Risk Question: Are concentrations of metals and radionuclides present in on-site surface waters and instream sediments sufficient to adversely affect the structure and/or function of the aquatic plant communities in Blue Creek, the mine drainages, and the basins of the MA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface water and sediments in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface water and sediments exceed BM values or TIR criteria.

Assessment Endpoint #2: Function and Viability of the Benthic Macroinvertebrate Community

The benthic macroinvertebrate community of small streams is typically diverse taxonomically, morphologically, and physiologically, and is often numerically abundant. This community plays a key role in ecosystem functions such as nutrient cycling and organic matter processing, and is a food resource for fisheries, other macroinvertebrates (e.g., crayfish), and riparian animals. The overall risk question and measurable attributes for this assessment endpoint are:

Overall Risk Question: Are concentrations of metals and radionuclides present in on-site surface waters and instream sediments sufficient to adversely affect the structure and/or function of the benthic macroinvertebrate communities in Blue Creek, mine drainages, and the basins of the MA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface water and sediments in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface water and sediments exceed BM values or TIR criteria.

Assessment Endpoint #3: Function and Viability of the Fish Community

Fish communities play a key role in ecosystem functions such as energy flow, nutrient cycling and organic matter accumulation, and are a food source for higher trophic level species. Various fish communities are encountered in streams including minnows and sunfish and predacious species (e.g., trout, sculpin, salmon). The overall risk question and measurable attributes for this assessment endpoint are:

Overall Risk Question: Are concentrations of metals and radionuclides present in on-site surface waters and sediments sufficient to adversely affect the structure and/or function of the fish communities in Blue Creek, mine drainages, and the basins of the MA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface water and sediments in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface water and sediments exceed BM values or TIR criteria.

Riparian and Wetland Ecosystems

Assessment Endpoint #4: Function and Viability of the Riparian Plant Community

Riparian and wetland plants provide food, habitat, and cover for a variety of amphibians, reptiles, mammals, and birds. Riparian and wetland plant communities at the Midnite Mine site consist of a diverse group of woody and herbaceous plants. The overall risk question and measurable attributes for this assessment endpoint are:

Overall Risk Question: Are concentrations of metals and radionuclides present in on-site surface waters and riparian sediments sufficient to adversely affect the structure and/or function of the riparian plant communities in the PIA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface water and riparian sediments in the PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface water and riparian sediments exceed BM values or TIR criteria.

Assessment Endpoint #5: Function and Viability of the Riparian Animal Community

The Midnite Mine site has a diverse group of animals consisting of reptiles, amphibians, birds, and mammals that would utilize and/or inhabit the riparian habitats onsite as described in the

Characterization of Riparian and Wetland Ecosystems (Section 2.2.1.2). The overall risk questions and measurable attributes for this assessment endpoint are:

Overall Risk Questions: Are concentrations of metals and radionuclides present in on-site surface waters and riparian sediments sufficient to adversely affect the structure and/or function of the riparian animal communities in the PIA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface water and riparian sediments in the PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface water and riparian sediments exceed BM values or TIR criteria.

Terrestrial Ecosystems

Assessment Endpoint #6: Function and Viability of the Terrestrial Soil Community

The soil community of a terrestrial ecosystem plays a key role in ecosystem functions such as nutrient cycling and organic matter processing. Soil invertebrates can be an important food resource for upper level trophic level species such as insectivorous small mammals and birds. The overall risk question and measurable attributes for this assessment endpoint are:

Overall Risk Question: Are concentrations of metals and radionuclides present in on-site soils sufficient to adversely affect the structure and/or function of the terrestrial soil communities in the MA and PIA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface level and subsurface soils in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface level and subsurface soils exceed BM values or TIR criteria.

Assessment Endpoint #7: Function and Viability of the Terrestrial Plant Community

The terrestrial rooted vascular plant community assumes many functions in the ecosystem including providing nesting and cover habitat for wildlife, serving as a basis for food production in the terrestrial ecosystem, and serving as an important role in nutrient and mineral cycling. The overall risk question and measurable attributes for this assessment endpoint are:

Overall Risk Question: Are concentrations of metals and radionuclides present in on-site soils sufficient to adversely affect the structure and/or function of the terrestrial plant communities in the MA and PIA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in surface level and subsurface soils in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in surface level and subsurface soils exceed BM values or TIR criteria.

Assessment Endpoint #8: Function and Viability of the Avian Community

The Midnite Mine site hosts a diverse group of avian receptors including insectivores (e.g., cliff swallow), omnivores (e.g., mallard, blue jay, chickadee), soil invertebrate feeders (e.g., common snipe, American robin), carnivores (e.g., great horned owl, barred owl, redtail hawk), piscivores (e.g., great blue heron, bald eagle), and herbivores (e.g., song sparrow, spruce grouse). These avian receptors are exposed to chemical and radionuclide stressors from surface waters, soil or sediment ingestion and contact, and food ingestion. The overall risk questions and measurable attributes for this assessment endpoint are:

Overall Risk Questions: Are concentrations of metals and radionuclides present in on-site surface water, sediment, or soil sufficient to adversely affect the structure and/or function of the terrestrial avian communities in the MA and PIA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in on-site matrices in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in on-site matrices exceed BM values or TIR criteria.

Assessment Endpoint #9: Function and Viability of the Mammal Community

The Midnite Mine site hosts a diverse group of mammalian receptors including herbivores (e.g., meadow vole, white-tailed deer, mule deer, marmot, elk), carnivores (e.g., masked shrew, bobcat, red fox, wolverine, gray wolf, bobcat), omnivores (e.g., deer mice, raccoon, grizzly bear), and piscivores (e.g., river otter, mink). These receptors are exposed to chemical and radionuclide stressors from surface waters, soil or sediment ingestion and contact, and food ingestion. The overall risk questions and measurable attributes for this assessment endpoint are:

Overall Risk Questions: Are concentrations of metals and radionuclides present in on-site surface water, sediment, or soil sufficient to adversely affect the structure and/or function of the mammal communities in the MA and PIA?

Measures of Exposure: Determine the concentrations of site-related metals and radionuclides in on-site matrices in the MA and PIA.

Measures of Effects: Determine if concentrations of site-related metals and radionuclides in on-site matrices exceed BM values or TIR criteria.

2.2.5 Exposure Pathways

Table 1 summarizes the exposure pathways via radiation, direct contact, and ingestion for aquatic, riparian, and terrestrial receptors. More details on the life histories of selected receptors are presented in the BERA in Section 3.0.

2.3 Analysis

2.3.1 Exposure Analysis

Metals and radionuclides that were analyzed as part of the site investigations by Ecology & Environment during 1998 (E&E 1998), by SMI in 1999 (SMI 1999a), and by URS from 1999 to 2001 (URS 2000a, 2001a, 2001b) were compiled into an electronic database. Summary tables for metals for each AOI and matrix are presented in Appendices D through G. Each summary table includes the number of samples analyzed for each COPC, the number of samples in which the analyte was detected above the sample detection limit (SDL), the minimum concentration detected, the maximum concentration detected, the central tendency (i.e., median or mean value), the BM value, the HQ, and the COPCs being retained for the BERA. Appendix B presents the statistical methods for calculating central tendency. Appendix H presents the summary tables for TIR calculations.

Four matrices – surface water, instream sediments, riparian sediments, and soils – were collected from these site investigations.

2.3.1.1 Surface Water Sampling

Surface water sampling was subdivided into total metals and dissolved metals. Surface water was collected at the lacustrine AOIs in the MA and the riverine AOIs in the PIA. The lacustrine AOIs in the MA include Pit 3, Pit 4, Blood Pool, Pollution Control Pond (PCP), and Outfall Pond. The riverine AOIs in the PIA include the runoff drainages from the MA and Blue Creek. The sampling sites for the runoff drainages are designated as Far Western Drainage, Western Drainage, Northeastern Drainage, Central Drainage, Upper Eastern Drainage, and Lower Eastern Drainage. The sampling sites for Blue Creek are designated as Upper Blue Creek, Middle Blue Creek, and Lower Blue Creek. Upper Blue Creek is situated above the confluence of the Eastern Drainage with Blue Creek, while Middle Blue Creek is situated below the confluence of the Eastern Drainage. Lower Blue Creek is situated below the confluence of Oyachen Creek. One location was situated in FDR Lake.

2.3.1.2 Instream Sediment Sampling

Two types of instream sediments were collected based on the mode of sampling – composite sampling and grab sampling. Instream sediment samples were collocated with surface water sampling locations for each AOI. Instream sediments refer to sediments that were collected within the beds of the lacustrine and riverine AOIs.

2.3.1.3 Riparian Sediment Sampling

Grab samples were collected for the riparian sediments at six AOIs in the PIA. The riparian AOIs are designated as Western Drainage, Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Middle Blue Creek, and Lower Blue Creek.

2.3.1.4 Soil Sampling

Soils were subdivided into surface soils and subsurface soils. The surface sampling of soils in the MA consisted of a random distribution of sampling throughout the MA. Subsurface soils were not collected in the MA. Surface and subsurface sampling of soils in the PIA was performed at four AOIs designated as the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road.

2.3.2 Characterization of Effects

This section contains the selection process for the ecotoxicological BM values for surface waters, sediments, and soils (Section 2.3.2.1), the decision criteria for the elimination or retention of metals as COPCs (Section 2.3.2.2), and the methodology for screening TIR (Section 2.3.2.3).

2.3.2.1 Ecotoxicological Benchmark Values

Ecotoxicological screening BMs are concentrations of chemicals that are reasonably considered to be the highest acceptable concentration at or below which there should not be no adverse environmental effects. If the BM is below a conservatively defined exposure of a chemical or below the reported detection limit, additional analysis is needed to assess the risk. For chemicals for which toxicity data are not available and a BM cannot be developed, further assessment is necessary.

Table 2 presents the BM values for soil, sediment, and surface water selected for this SLERA. The selection of these BMs is based on the most current criteria, guidance, and technical data available and is presented in Tables 3, 4, and 5 for soils, sediments, and surface waters, respectively.

The final BM values selected for the SLERA were based on the more conservative value of the available published BM values. The selection process for the BMs and the citations used are provided below.

2.3.2.1.1 Soil Benchmarks

Benchmarks for soils were chosen by comparing the Oak Ridge National Laboratory (ORNL) toxicological BMs of each of the analytes with plants, soil microorganisms, and earthworms (Table 3). Soil BMs for plants appear in “Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants” (Efroymson *et al.* 1997a). Benchmarks for soil microorganisms and earthworms appear in “Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process” (Efroymson *et al.* 1997b). The lowest BM value available between the three types of soil receptors was selected to represent the BM for the soil SLERA. For example, arsenic (As) has BM values of 10 milligrams per kilogram (mg/kg), 100 mg/kg, and 60 mg/kg for plants, microorganisms, and earthworms, respectively. For the SLERA the lowest BM of 10 mg/kg was selected for As.

For those analytes for which soil BM values are not available (calcium [Ca], magnesium [Mg], potassium [K], and sodium [Na]), the analytes were not eliminated as COPCs. All soil BMs are expressed in units of mg/kg dry weight (dw).

2.3.2.1.2 Sediment Benchmarks

Sediment BM values (Table 4) are based on the consensus-based threshold effect concentration (TEC) values for all analytes for which values were available (MacDonald, *et al.* 2000). For those analytes for which a consensus-based TEC was not available, the lowest sediment quality guideline (SQG) was selected as the sediment BM value except for uranium (U) (EVS 1998). The U BM values are derived from the “Priority Substances List Assessment Report on Releases of Radionuclides from Nuclear Facilities” (Environment Canada 2000).

Table 4 lists both the consensus-based TEC and the consensus-based probable effect concentration (PEC) values for those analytes of concern for which three or more published SQGs were available. These published SQGs were used for developing the consensus-based values for each contaminant for sediments. The TEC value is the concentration below which adverse effects are not expected to occur and the PEC value is the concentration above which adverse effects would be expected to occur (MacDonald *et al.* 2000). Consensus-based TEC values for this SLERA were available for the following analytes- As, cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn).

The SQG values were derived from a compilation of worldwide SQG for metals (EVS 1998). Table 4 lists three levels of SQGs for each of the analytes defined as low, mid, and high. The high SQG is often based on the metal concentration in sediments above which adverse effects on most species are frequently or always observed or at a level in which the sediment is highly polluted and likely to affect the health of sediment dwelling organisms. The mid level SQG values often range from metal concentrations in the sediment above which adverse effects on sensitive species or life stages are expected to occur to metal concentrations above which effects can be expected to occur frequently. The low SQG level represents either the background level that is not expected to cause an adverse effect or a concentration above which effects are expected to rarely occur. For this SLERA, the low SQG BM was selected if a consensus-based TEC was not available.

Specific screening level concentrations for U were developed in northern Saskatchewan in the location of Canada's operating uranium mines (Environment Canada 2000). Environmental monitoring data for sediment contaminant concentrations and co-occurring benthic invertebrate monitoring data in northern Saskatchewan lakes near operational and pre-operational uranium mines were used to calculate lowest effect level (LEL) and the severe effect level (SEL). The calculations followed EPA procedures for calculating screening level concentrations from field data (Neff *et al.* 1986). The SEL value relating to the value that could potentially eliminate most of the benthic organisms was calculated to be 390 mg/kg dw. A LEL corresponding to the value at which actual toxic effects become apparent was calculated at 21mg/kg dw. This LEL value was selected as the critical toxicity value and the estimated no effects value which is within the background range for U concentrations in sediments in northern Saskatchewan ranging from 29.5 mg/kg dw at the 95% confidence limit (CL) to 17 mg/kg dw at the 90% CL. The 17 mg/kg dw value as U was selected as the low SQG value to be used for this SLERA.

For those analytes for which sediment BMs were not available [Ca, molybdenum (Mo), K, Na, and vanadium (V)], those analytes were not eliminated as COPCs. All sediment BM values are expressed in units of mg/kg dw.

2.3.2.1.3 Surface Water Benchmarks

Surface water BMs expressed in units of micrograms per liter (µg/L) were derived from either the National Recommended Water Quality Criteria (NRWQC), the Spokane Tribe Water Quality Criteria (STWQC), or the water quality criteria from particular U.S. EPA regions (Table 5). For this SLERA the water quality criteria between NRWQC and STWQC were compared (USEPA 2002, STI 2001). With the exception of Hg, most of the BM values for the STWQC were either comparable to NRWQC or slightly higher. If the water quality criterion for a particular analyte was not available from either the NRWQC or STWQC, then the surface water BM was selected from the water quality criteria cited by one or more EPA regional offices. For this SLERA the more conservative water quality criteria were selected to represent the surface water BM value.

For the hardness-dependent metals including Cd, Cu, Pb, Ni, and Zn, the water quality criteria are based on dissolved metal concentrations at water hardness of 100 milligrams per liter (mg/L) as calcium carbonate ($CaCO_3$). For this SLERA, the surface water BMs for these metals were calculated based on dissolved metal concentrations at a water hardness of 30 mg/L as $CaCO_3$ following the formulas provided by EPA (USEPA 2002).

Benchmarks for trivalent chromium (Cr III) and hexavalent chromium (Cr VI) are provided in Table 5. For this SLERA, the lowest Cr benchmark (i.e., Cr VI) of 10 µg/L (STI 2001) was selected. For Hg, both BM values from NRWQC and STWQC of 0.77 µg/L and 0.012 µg/L , respectively, were selected for the SLERA.

The BM for U of 2.6 µg/L is based on two acute toxicity determinations for brook trout by applying a Tier II National Ambient Water Quality Criteria (NAWQC) procedure (Stephan *et al*.1985, Parkhurst *et al*. 1984). This Tier II procedure (Stephan *et al*.1985) for deriving water quality criteria is applied when data requirements for Tier I criteria cannot be met. Tier I criteria requires at least eight acute toxicity studies or at least three chronic studies for different species. When these data requirements are not met, then a Tier II calculation using various application factors for “margins of safety” is applied (Appendix C).

2.3.2.2 Decision Criteria for Elimination or Retention of Metals as COPCs

The HQ method was used in the SLERA to estimate risk for each COPC. This method compares the EC to BM values and is expressed as a ratio per the following formula:

$$HQ = EC / BM$$

Where EC is the maximum concentration of the COPC and BM represents the “no effect” or “safe level” concentrations for that analyte for surface waters, sediments, or soils.

A HQ equal to or greater than 1.0 indicates either there is a likelihood of risk or there is insufficient information to conclude negligible risk from exposure to a contaminant at concentrations measured on-site. A HQ of less than 1.0 does not indicate a lack of risk, but suggests that there is a high degree of confidence that minimal risk exists for the given COPC, particularly given that the BMs were selected based on the lowest measurable concentration considered to be protective of the most sensitive organism relative to an exposure defined by maximum concentration.

Three criteria that were used for deciding whether to retain a COPC are:

1. All metals with HQs equal to or greater than 1.0, or
2. BM value was not available for that particular COPC, or
3. The BM was below the analytical detection limit.

2.3.2.3 Total Ionizing Radiation Screening Methodology

Risk from TIR to aquatic biota, riparian animals, terrestrial animals, and terrestrial plants was evaluated following guidance for general screening provided in “A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota” (USDOE 2002).

The USDOE graded approach consists of a three-step process for evaluating radiation doses to aquatic and terrestrial biota that is designed to provide guidance from an initial, conservative screening to, if needed, a more rigorous analysis using site-specific information. The three-step process includes: (1) assembling radionuclide concentration data defining sources, receptors, and routes of exposure to be evaluated; (2) applying a general conservative screening methodology where maximum exposure media concentrations are compared with biota concentration guides (BCG) in soil, sediment and water; and (3) if needed, conducting an analysis through site-specific screening, site-specific analysis, or a site-specific biota dose assessment (USDOE 2002).

BCGs are screening values representing the limiting concentration of the specific radionuclide in an environmental matrix that would not result in the exceedance of recommended dose standards to biota. BCGs have been derived for aquatic and terrestrial systems that are based on aquatic animal, riparian animal, terrestrial plant and terrestrial animal reference organisms. The dose rate limits used to derive the BCGs for each organism type are 1 rad per day (rad/day) for aquatic animal, 0.1 rad/day for riparian animal, 1 rad/day for terrestrial plant, and 0.1 rad/day for terrestrial animal. Thus, a dose rate limit of 1 rad/day or less is not to likely cause observable changes in aquatic biota populations or terrestrial plant populations, and a dose limit of 0.1 rad/day or less is not to likely cause observable changes in populations of riparian or terrestrial animals. For aquatic or riparian animals, BCGs are available for both aquatic and riparian biota exposed to a range of radionuclides in surface water as picocurie per liter (pCi/L) and instream or riparian sediment as picocurie per gram (pCi/g). For terrestrial systems BCGs are available for terrestrial animals and plants exposed to a range of radionuclides in water and soil (USDOE 2002).

For this SLERA, the general conservative screening methodology was conducted using the maximum concentrations of the site-specific isotopes in water, sediments, and soils. The maximum concentrations were compared with the corresponding

BCGs using a sum-of-fractions approach. The six site-related isotopes measured in water, instream sediment, riparian sediment, and soil are radium 226 (^{226}Ra), radium 228 (^{228}Ra) , thorium 232 (^{232}Th), uranium 234 (^{234}U), uranium 235 (^{235}U), and uranium 238 (^{238}U). BCGs for each radionuclide and for each environmental medium were derived from U.S. DOE RESRAD-BIOTA model, Version 1 (USDOE 2003). The overall exposure is the sum of exposures to water and instream sediments for aquatic animals, water and riparian sediments for riparian animals, and water and soil for terrestrial animals and plants.

The overall exposure for aquatic animals or riparian animals was based on two exposure media (surface water and instream sediment for aquatic animals and surface water and riparian sediments for riparian animals) and the site-related radionuclides (A,B, … N) at maximum concentrations (C_A, C_B,.. C_N), and the corresponding BCGs (BCG_A, BCG_B, … BCG_N). The sum-of-fractions process is as follows:

Sum = (C_A/BCG_A + C_B/BCG_B +… C_N/BCG_N) water + (C_A/BCG_A + C_B/BCG_B +… C_N/BCG_N) sediment

The sum of the fractions is converted to TIR as rad/day. If the TIR was less than 1.0 rad/day, it was concluded that the dose to an aquatic animal does not exceed the recommended dose limits for the protection of populations of aquatic animals in that stream segment. Conversely, if the TIR was greater than 1.0 rad/ day, the TIR at that location exceeds the recommended dose and further investigation is needed. For riparian animals if the TIR was less than 0.1 rad/day, it was concluded that the dose to a riparian animal does not exceed the recommended dose limits for the protection of populations of riparian animals in that stream segment. Likewise, if the TIR was greater than 0.1 rad/day, the TIR at that location exceeds the recommended dose for riparian animal and further investigation is needed.

Since instream sediment data are derived from two sample types (composite samples and grab samples), risk estimations for TIR in or along the stream segments and water bodies are presented for two combinations of data: (1) instream sediment composite plus surface water data; and (2) instream sediment grab plus surface water data.

The overall exposure for terrestrial systems was based on two exposure media (water and soil) and the site-related radionuclides (A,B, ... N) at maximum concentrations (C_A, C_B, … C_N), and the corresponding BCGs (BCG_A, BCG_B, … BCG_N) for terrestrial plants and animals. The sum-of-fractions process is as follows:

Sum = (C_A/BCG_A + C_B/BCG_B +… C_N/BCG_N) water + (C_A/BCG_A + C_B/BCG_B +… C_N/BCG_N) soil

The sum of the fractions is converted to TIR as rad/day. If the TIR was less than 1.0 rad/day, it was concluded that the dose to a terrestrial plant does not exceed the recommended dose limits for protection of populations of terrestrial plants in that exposed area. Conversely, if the TIR is greater than 1.0 rad/day, the TIR at that location exceeds the recommended dose and further investigation is needed. For terrestrial animals if the TIR was less than 0.1 rad/day, it was concluded that the dose to a terrestrial animal does not exceed the recommended dose limits for the protection of populations of animals in that exposed area. Likewise, if the TIR was greater than 0.1 rad/day, the TIR at that location exceeds the recommended dose to animals and further investigation is needed.

Since soil data are derived from surface and sub-surface samples, risk estimations for TIR in the PIA and MA for terrestrial systems are presented for two combinations of data: (1) surface soil plus surface water data; and (2) sub-surface soil plus surface water for animals and plants, respectively. The soil samples in the PIA were collocated with surface water exposures that were closest to the soil samples and for which data was available. For the northeastern area of the PIA, the southwestern area of the PIA, the East Haul Road, and the West Haul Road, the water exposures were collocated with the Northeastern Drainage, the Western Drainage, the Upper Eastern Drainage, and the Western Drainage, respectively. The soil samples in the MA were collocated with surface water exposure derived from Pit 3 representing the more elevated exposures.

2.4 Risk Characterization of the Screening Level Ecological Risk Assessment

The risk characterization phase of this SLERA includes the risk estimation (Section 2.4.1) and risk description (Section 2.4.2). The risk estimation provides the quantitative assessments from the HQs and the TIR calculations for surface water, instream sediments, riparian sediments, and soils. The risk description section delineates the risk being imposed to the three ecosystems (aquatic, riparian, and terrestrial) based on the COPCs being retained for the BERA, and identifies the AOIs at risk and the assessment endpoints at risk.

2.4.1 Risk Estimation of the Screening Level Ecological Risk Assessment

2.4.1.1 Surface Water

Risk estimations of the metals in surface waters were screened based on total metal and dissolved metal concentrations. The HQs were derived by comparing the maximum concentrations analyzed relative to the BM value. The BM values for most of the analytes, as described in Section 2.3.2.1.3, are based on conservative water quality criteria (WQC). In addition, for the hardness-dependent metals (Cd, Cu, Pb, Ni, and Zn), the BM values are based on the dissolved concentrations at a water hardness of 30 mg/L as $CaCO_3$. The same BM values that were used for screening total metals were also used for screening the dissolved metals.

2.4.1.1.1 Surface Water: Total Metals

Data summaries for the screening of total metals for each AOI are presented in Tables D-1 to D-16 (Appendix D). Each of these tables highlight the COPCs being retained for that AOI. These summary tables also provide the number of samples, number of analytical detections for each analyte, the minimum and maximum values for each analyte, the central tendency of the dataset for each analyte, the BM, the HQ, and the rationale for retaining the COPC. Table 6 provides a summary of the total metals in surface waters being retained and not being retained as COPCs for each AOI. An overview of these results follows:

Antimony (Sb), As, thallium (Tl), and V consistently had HQs of less than 1.0 for the AOIs in both the MA and PIA with the exception of two locations (Tables D-1 to D-16). These two exceptions were for the Northeastern Drainage where one analysis for V had a HQ greater than 1.0 (Table D-8) and for FDR Lake where the Tl BM value was less than the detection limit (Table D-15). These four analytes are not being retained as COPCs for the surface waters as total metals.

Mercury

Mercury concentrations for all samples at each AOI for the MA and PIA were reported as being non-detectable with only a few samples that reported concentrations of 0.2 µg/L to 0.3 µg/L. The highest Hg value was reported for an Upper Blue Creek sample at 0.3 µg/L with the remaining 12 samples from that location being below the detection limit (Table D-12). Two BM values were used for screening Hg as described in Section 2.3.2.1.3. One BM value of 0.77 µg/L was derived from NRWQC while the other BM value of 0.012 µg/L was derived from STWQC. When applying the BM of 0.77 µg/L, either the HQ was less than 1.0 or the BM value was greater than the sample detection value (SDL). When applying the BM value of 0.012 µg/L, the BM value was less than the SDL thereby retaining Hg as a COPC.

Aluminum

Aluminum (Al) was screened in surface waters relative to a BM value of 87 µg/L. Aluminum is highlighted as a COPC at each AOI in the MA and PIA (Table 6). The high concentrations for Al in the MA, particularly at Pit 3 (Table D-1), Blood Pool (Table D-3), and the PCP (Table D-4), resulted in HQ values that exceeded 1,000. The HQ values for the Drainages were above 10 but below 100, except for the Northeastern Drainage with a HQ of 472 (Tables 6 and D-8). Likewise, the upper, middle, and lower Blue Creek locations exhibited HQs above 10, but below 100. Only one sample was analyzed for the FDR Lake location for which the BM for Al was below the detection limit (Table D-15).

Barium

The BM value for screening Barium (Ba) was 3.9 µg/L. Barium is a COPC at each AOI in the MA and PIA as a result of HQs exceeding 1.0 (Table 6). Two locations in the MA area - Pit 3 and the Outfall – had HQs exceeding 10 while the other AOIs in the MA had HQs less than 10. The maximum concentration of Ba was observed for the Outfall Pond at 78.1 µg/L (Table D-5). The HQs for the drainages exceeded 10 except for the Central Drainage with a HQ of 4.2. The HQs for the Upper, Middle, and Lower Blue Creek locations exceeded 10 while the HQ at the FDR Lake was greater than 1.0 for Ba.

Beryllium

Beryllium (Be) was screened in surface waters relative to a BM value of 0.53 µg/L. Beryllium is retained as a COPC at each AOI in the MA with HQs exceeding 10 except the Outfall Pond with a HQ of less than 1.0 (Table 6). Beryllium is highlighted as a COPC for the Western, Northeastern, and Central Drainages with HQs of 8.1, 12.5, and 6.0, respectively. Beryllium is not retained as a COPC at the Far Western Drainage since HQ was less than 1.0. For the Upper and Lower Eastern Drainages and the Upper, Middle, and Lower Blue Creek locations, the BM value was above the SDL; therefore Be is not retained as a COPC for these AOIs.(Tables D-12 to D-14). For the FDR Lake location, the SDL was greater than the BM value, retaining Be as a COPC at this location (Table D-15).

Cadmium

Since Cd is a hardness-dependent metal, the BM value of 0.12 µg/L was based on dissolved metal concentrations at a water hardness of 30 mg/L as $CaCO_3$. Cadmium is retained as a COPC at each AOI in the MA (Tables 6 and D-1 to D-5). The highest concentrations of Cd were observed at Pit 3 and the PCP with concentrations of 70 µg/L (Tables D-1 and D-4). In comparison, 11 of the 12 samples analyzed for Cd in Pit 4 were below SDL with one sample having a concentration of 0.2 µg/L (Table D-2). Cd is also retained as a COPC for all the drainages (Table 6). Two of the drainages, the Far Western and Northeastern Drainages, are retained for Cd since the BM value was less than the SDLs while the remaining drainages had HQs exceeding 10. Likewise, the HQs for Cd for the Upper, Middle and Lower Blue Creek locations exceeded 10. The FDR Lake location was retained since the BM value was below the SDL.

Chromium

Surface water screening for Cr was based on a BM value of 10 µg/L as Cr VI. For the MA, Cr is retained as a COPC at Pit 3, Blood Pool, and PCP with HQs of 3.4, 2.7 and 3.3, respectively (Tables D-1, D-3, D-4). The highest Cr concentration detected at 34.3 µg/L was in the MA at Pit 3 (Table D-1). Cr is not retained as a COPC at Pit 4 and the Outfall since the HQs were less than 1.0 at these locations (Tables D-2 and D-5). Two drainages, the Central Drainage and the Lower Eastern Drainage, are not being retained for Cr since the HQs are less than 1.0 at these locations (Tables D-9 and D-11). Chromium was also not retained as a COPC at the Far Western Drainage since the BM was greater than the SDL (Table D-7). Three drainages (Western, Northeastern, and Upper Eastern) had HQs that were equivalent to 1.0 or exceeded 1.0 (Table 6). Chromium is retained as a COPC at the Middle and Lower Blue Creek locations, but not at the Upper Blue Creek or FDR Lake locations. The HQs at Middle and Lower Blue Creek are 1.1 and 1.3, respectively, with the highest concentration of 13 µg/L detected at the Lower Blue Creek (Tables D-13 and D-14).

Cobolt

The BM value used for screening Cobalt (Co) was 3 µg/L. Cobalt is retained as a COPC at three locations in the MA (Pit 3, Blood Pool, and PCP (Table 6). These three AOIs in the MA had HQs that exceeded 100 with maximum concentrations ranging from 792 µg/L at the Blood Pool (Table D-3) to 1330 µg/L at the PCP (Table D-4). In contrast, Pit 4 and the Outfall had HQs less than 1.0 (Tables D-2 and D-5). Cobalt is retained as COPC at the Northeastern and Central Drainages with HQs of 7.8 and 20, respectively. Cobalt is not retained as COPC at the remaining drainages, including Western, Far Western, Upper Eastern, and Lower Eastern Drainages, since the HQs were less than 1.0 or the BM value was greater than the SDL (Tables D-6, D-7, D-10, D-11). Likewise, Co is not retained as a COPC at any of the Blue Creek locations or FDR Lake.

Copper

Since Cu is a hardness-dependent metal, the BM value for Cu of 3.2 µg/L was based on the dissolved metal concentrations at a water hardness of 30 mg/L as $CaCO_3$. Copper is retained as a COPC for all AOIs for the MA and PIA with the exception of the Far Western Drainage (Table 6). For the MA, two AOIs (Blood Pool and PCP) had HQs that exceeded 100. The highest Cu concentration of 1,190 µg/L was found at the Blood Pool (Table D-3). The HQ at Pit 3 was 89 while the HQs at Pit 4 and the Outfall were 7.2 and 2.6, respectively. With the exception of the Far Western Drainage, all the drainages had HQs exceeding 10 (Table 6). The Upper, Middle, and Lower Blue Creek locations had HQs ranging from 4.4 to 12.5. The HQ for the FDR Lake location was 2.7.

Iron

Iron (Fe) was screened at each of the surface water AOIs for total Fe relative to a BM of 1,000 µg/L (1.0 mg/L). Three AOIs in the MA (Pit 3, Blood Pool, and

PCP) had HQs exceeding 1.0 (Table 6). The Blood Pool had the highest concentration of Fe in the MA at 16,600 µg/L (16.6 mg/L) (Table D-3). Iron was retained as a COPC at four drainages including Western, Far Western, Northeastern, and Upper Eastern with HQs ranging from 1.3 to 66. The highest HQ of 66 at the Northeastern Drainage was based on one sample with Fe concentration of 66,000 µg/L (66 mg/L) (Table D-8). Iron was not retained as a COPC at the Central or Lower Eastern Drainages with HQs less than 1.0. Iron was also retained as a COPC at the Upper, Middle, and Lower Blue Creek locations since the HQs exceeded 1.0. The FDR Lake location had HQ less than 1.0 (Table 6), eliminating Fe as a COPC at this AOI.

Lead

Since Pb is a hardness-dependent metal, the BM of 0.7 µg/L was based on the dissolved metal concentrations at a water hardness of 30 mg/L as $CaCO_3$. For the MA, Pb was retained as a COPC at Pit 3, Pit 4, Blood Pool, and PCP with HQ ranging from 10.4 to 56.3 (Table 6). Pit 3 had the highest concentration of Pb at 39.4 µg/L (Table D-4). Because the BM was greater than the SDL for the Outfall Pond, Pb was eliminated as a COPC. Four drainages (Western, Far Western, Upper Eastern, and Lower Eastern) had HQs greater than 1.0 but less than 10. One of the drainages, the Northeastern Drainage, had a HQ exceeding 10. Pb was not retained as a COPC at the Central Drainage since the BM value was greater than the SDL. The Upper, Middle, and Lower Blue Creek locations had HQs for Pb ranging from 3.6 at Lower Blue Creek to 13.1 at Upper Blue Creek (Table 6). For the FDR Lake location the BM value was greater than the SDL eliminating Pb as a COPC (Table D-15).

Magnesium

The BM used for screening Mg was 82,000 µg/L (82 mg/L). For the MA four AOIs have HQs exceeding one but less than 10 (Table 6). Pit 4 has a HQ less than one (Table D-2). The highest concentration of Mg at 402,000 µg/L (402 mg/L) was determined at the PCP (Table D-4). Four of the drainages - Western, Central, Upper Eastern, and Lower Eastern - had HQs exceeding 1.0 but less than 10 for Mg (Table 6). Two drainages, Far Western and Northeastern, had HQs less than 1.0 for Mg (Tables D-7 and D-8). The Upper Blue Creek and FDR Lake had HQs less than 1.0 while the HQs for Middle and Lower Blue Creek were 1.1 and 1.0, respectively (Table 6).

Manganese

Screening for manganese (Mn) was based on BM value of 80 µg/L. Manganese is retained as a COPC at each of the AOIs in the MA represented by a wide range of HQs (Table 6). Pit 3 and PCP had HQs exceeding 1,000 with the highest concentrations of Mn found at 120,000 µg/L and 142,000 µg/L, respectively (Tables D-1 and D-4). The Blood Pool had a HQ of 460 while Pit 4 and the Outfall Pond had HQs of 11 and 4.6, respectively (Table 6). Like the MA, the HQs for the drainages also were represented by wide range of values from above 1.0 at the Northeastern Drainage, above 10 at the Lower Eastern Drainages, and above 100 at the Western and Upper Eastern Drainages to above 1,000 at the Central Drainage (Table 6). Only the Far Western Drainage had a HQ less than 1.0 (Table D-7). The HQs at Upper Blue Creek and FDR Lake were less than 1.0 while the HQs for Middle and Lower Blue Creek locations were 13.4 and 1.1, respectively.

Nickel

Since Ni is a hardness-dependent metal, the BM value of 19 µg/L was based on the dissolved metal concentrations and a water hardness of 30 mg/L as $CaCO_3$. For the MA, Ni was retained as a COPC at Pit 3, Pit 4, Blood Pool, and PCP (Table 6). The maximum concentrations for Ni of 2,430 µg/L and 2,760 µg/L were detected at Pit 3 and PCP, respectively (Tables D-1 and D-4). The Outfall Pond had a HQ less than 1.0 (Table D-5) and Ni was not retained as a COPC for this AOI. Except for the Far Western Drainage having a HQ less than 1.0, all the other drainages had HQs exceeding 1.0 (Table 6). The Central Drainage had the highest concentration of Ni detected at 1,380 µg/L deriving a HQ of 73 (Table D-9). Nickel was not retained as a COPC at the Upper Blue Creek, Lower Blue Creek, or FDR Lake since either the HQ was less than 1.0 or BM was greater than the SDL (Tables D-12, D-14, D-15). Middle Blue Creek had a HQ of 1.1 (Table D-13) and therefore Ni was not retained as a COPC at this AOI.

Selenium

Selenium (Se) was screened using a BM value of 5 µg/L. Se was retained as a COPC at three AOIs in the MA including Pit 3, Blood Pool, and PCP (Table 6). Selenium was not retained at any of the AOIs in the PIA since either the HQ was less than 1.0 or the BM was greater than the SDL.

Silver

Screening of total metals for silver (Ag) was based on a BM value of 0.08 µg/L. Silver is retained as a COPC at all AOIs in the MA and PIA since either the HQ exceeds 1.0 or BM is below the SDL (Table 6). The majority of all the samples analyzed for Ag for each of the AOIs in the MA and PIA were reported as being non-detectable (Tables D-1 to D-15). The SDLs ranged from 0.7 to 2.0 µg/L which are above the BM value. The highest Ag concentration of 60 µg/L was reported for Pit 3 (Table D-1). Concentrations of 10 µg/L or less were reported for the other AOIs.

Uranium

Screening of total metals for U was based on a BM value of 2.6 µg/L. Uranium is retained as a COPC at each AOI in the MA and PIA except for the FDR Lake (Table 6). The highest HQs exceeding 1,000 were in the MA. The highest concentrations of U were detected at Pit 3 and the PCP with concentrations of 24,000 µg/L and 30,000 µg/L, respectively (Tables D-1 and D-4). The Outfall Pond had lower concentrations of U with a HQ of 98 (Table D-5). The HQs for the drainages ranged from 3.8 at the Far Western Drainage to 412 at the Northeastern Drainage. The HQs at the Upper, Middle, and Lower Blue Creek locations ranged from 10.4 to 38. Uranium was not retained as a COPC at FDR Lake since the BM value was greater than the SDL (Table D-15).

Zinc

Since Zn is a hardness-dependent metal, the BM value of 41 µg/L was based on the dissolved metal concentrations at a water hardness of 30 mg/L as $CaCO_{3.}$ Zinc is retained as a COPC at each of the AOIs in the MA with the exception of the Outfall Pond (Table 6). The highest concentrations of Zn in the MA were reported for Pit 3 and the PCP at concentrations of 5,480 µg/L and 6,000 µg/L, respectively (Tables D-1 and D-4). Zinc is also retained as a COPC at all AOIs in the PIA with the exception of the Far Western Drainage. The HQs for the drainages ranged from less than 1.0 at the Far Western Drainage to 73 at the Central Drainage. All of the HQs for the Upper, Middle, Lower Blue Creek locations and the FDR Lake were above 1.0 ranging from 1.3 to 1.7 (Table 6).

2.4.1.1.2 Surface Water: Dissolved Metals

Tables D-17 to D-31 (Appendix D) present the data summaries for the screening of dissolved metals at each AOI. Table 7 provides a summary of the dissolved metals in surface waters being retained as COPCs for each AOI.

The same BM values that were used to derive HQs for total metals were used for screening the dissolved metals. As previously noted, the BMs for the hardness-dependent metals were based on dissolved concentrations at a water hardness of 30 mg/L as $CaCO_3$. A similar trend exists at each AOI, including the relative magnitude of the HQs between the MA and PIA, particularly for Be, Cd, Co, Cu, Mn, Ni, and Zn. Four analytes - Al, Fe, Se, and U - were analyzed as total metals and not as dissolved metals. All COPCs being retained, as dissolved metals, are also being retained as total metals.

2.4.1.2 Instream Sediments: Composite and Grab Samples

Risk estimations of the metals in instream sediments were screened based on composite and grab samples. Summary tables for each type of sampling is provided giving the number of samples and number of analytical detections for each analyte, the minimum and maximum values for each analyte, the central tendency of the dataset for each analyte, the BM, the HQ, and the rationale for retaining the COPC. Tables E-1 to E-14 (Appendix E) present the data summaries for the screening of composite instream sediments for each AOI and Tables E-15 to E-28 (Appendix E) present the data summaries for the screening of instream sediments collected by grab sampling for each AOI. Tables 8 and 9 provide a summary of the COPCs being retained and not being retained by AOI for the composite samples and the grab samples, respectively.

Composite sampling in the MA was only performed at the Outfall Pond. Composite sampling in the PIA included the drainages (Far Western, Western, Northern, Northeastern, Southwestern, Central, Upper Eastern, and Lower Eastern Drainages), Blue Creek (Upper, Middle, and Lower), and FDR Lake location. The number of sampling events at each of the AOIs ranged from one to three samples with the exception of Upper Eastern Drainage with six samples.

Grab samples were taken at each AOI in the MA. The number of samples collected ranged from one to three. For the PIA, grab samples were collected at the Western, Central, Upper Eastern, and Lower Eastern Drainages and ranged from two to nine samples; at the Upper, Middle and Lower Blue Creek locations with number of samples ranging from one to seventeen; and one grab sample at the FDR Lake.

A general description of the contents of these tables with an emphasis on what analytes are being retained as COPCs follows:

Four analytes – Cr, Hg, Pb, and Tl – are not being retained as COPCs based on the screening of the composite and grab instream sediments indicating a negligible risk of these analytes both in the MA and PIA (Tables E1 to E-28). The HQs for the composite and grab sampling for Cr were all less than 1.0 at each AOI in the MA and PIA except for one sample collected from the Blood Pool. One grab sample collected at the Blood Pool had a HQ of 1.2 for Cr (Table E-17) indicating that Cr in instream sediments presented negligible risk at the site. The BM for Hg was greater then the SDL for all samples collected in the MA and PIA with the exception of two samples collected at the Central Drainage and the Northern Drainage. For these two samples the BM was less than the SDL indicating that Hg presented negligible risk at the site. The HQs for Pb and Tl were all less than 1.0 for each AOI in the MA and PIA.

Aluminum

The sediment BM value for screening Al was 9,400 mg/kg. Aluminum is being retained as a COPC at all AOIs in the MA with HQs of greater than 1.0 but less than five at Pit 3, Pit 4, the Blood Pool and the Outfall Pond (Table 9). The PCP with a maximum concentration from a grab sample of 160,000 mg/kg had the highest HQ of 17 in the MA(Table E-18). Al is being retained as a COPC with HQs greater than 1.0 but less than five with the exception of the Southwestern Drainage and Upper Blue Creek. The HQ equals 1.0 for the grab sediment and less than 1.0 for the composite sediment for the FDR Lake, retaining Al as a COPC at this AOI (Tables 8 and 9).

Antimony

The sediment BM value for screening Sb was 0.49 mg/kg. The Blood Pool and Outfall Pond were the only two AOIs with HQs greater than 1.0 with values of 3.3 and 3.7, respectively. No AOIs retained Sb as a COPC based on the composite sediments, but Sb is retained as a COPC for the remaining grab sediment samples in the MA and PIA based on the BM being less than the SDL (Table 9).

Arsenic

The sediment BM value for screening As was 9.79 mg/kg. Arsenic is retained as a COPC at each of the AOIs in the MA with HQs ranging from 2.6 at Pit 4 to 8.4 at the Outfall Pond based for the grab sediments (Table 9). Arsenic is not being retained for the Western Drainage, Far Western Drainage, Southwestern Drainage, and Upper Blue Creek (Tables E-2, E-6, E-10, E-20, E-24). All the other AOIs in the PIA including the drainages (Northeastern, Northern, Central, Upper Eastern, and Lower Eastern Drainages), Middle Blue Creek, Lower Blue Creek, and FDR Lake have HQs greater than 1.0 but less than 10 for either the grab or composite sediments (Tables 8 and 9). Middle Blue Creek had the highest HQ of 8.2 for the grab sample with a maximum concentration of 80 mg/kg (Table E-25).

Barium

The sediment BM value for screening Ba was 500 mg/kg. Barium was only retained as a COPC for the grab sediments at Pit 3, PCP, and Middle Blue Creek with HQs of 1.0, 1.4, and 1.3, respectively. For all other AOIs in the MA and PIA the HQs were less than 1.0 for the composite and grab sampling (Tables 8 and 9).

Beryllium

The sediment BM value for screening Be was 0.7 mg/kg. Beryllium is retained as a COPC at each of the AOIs in the MA based on either the grab or composite sediments with HQs ranging from 1.4 at the Outfall Pond for the grab sediment sample to 43 at PCP for the composite sediments (Tables 8 and 9). The highest concentration of Be (29.8 mg/kg) was found at the PCP (Table E-18). Three AOIs in the PIA – Southwestern Drainage, Upper Blue Creek and FDR Lake – are not retaining Be as a COPC sine the HQs are less than 1.0 for either grab or composite sediments. The remaining drainages, Middle Blue Creek, and Lower Blue Creek have HQs greater than 1.0 but less than 10 (Tables 8 and 9).

Cadmium

The sediment BM value used for screening Cd was 0.99 mg/kg. Cadmium is only retained as a COPC in the MA at the PCP with a HQ of 11.3 (Table 9). The remaining AOIs in the MA either had HQs less than 1.0 or BM was greater than the SDL. Several AOIs in the PIA are not retaining Cd as a COPC for either grab or composite sediments including four drainages (Far Western, Northeastern, Southwestern, and Northern Drainages), Lower Blue Creek, and FDR Lake (Tables 8 and 9). Cadmium is being retained as a COPC at Western Drainage, Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Upper Blue Creek and Middle Blue Creek with HQs exceeding 1.0 but less than 10 for grab and composite sediments except Lower Eastern Drainage (Tables 8 and 9). The Lower Eastern Drainage has HQ of 14.5 (14.4 mg/kg) for composite sediment (Table E-19).

Cobalt

The sediment BM value used for screening Co was 20 mg/kg. Cobalt is retained as a COPC in the MA at Pit 3, Pit 4, PCP, and Outfall Pond with HQs exceeding 1.0 but less than 10 for the composite sediments (Table 8). The PCP had the highest HQ of 8.3 with a maximum concentration of 166 mg/kg for the grab sediments (Table E-18). The Blood Pool had a HQ of less than 1.0 (Table E-17). Cobalt is retained as a COPC at five AOIs in the PIA - Western Drainage, Central Drainage, Upper and Lower Eastern Drainages, and Middle Blue Creek - based on either the grab or composite sediments (Tables 8 and 9). The highest HQ in the PIA was 7.0 at Middle Blue Creek with a maximum concentration of 139 mg/kg for the composite sediments (Table E-11). Several AOIs in the PIA had HQs less than 1.0 for grab or composite sediments including Northern Drainage, Far Western Drainage, Northeastern Drainage, Southwestern Drainage, Upper Blue Creek, Lower Blue Creek, and FDR Lake(Tables 8 and 9), eliminating Co as a COPC at these AOIs.

Copper

The sediment BM value for screening Cu was 31.6 mg/kg. Copper is retained as a COPC in the MA at Pit 3, Blood Pool, PCP, and Outfall Pond with HQs ranging from 1.8 at the Outfall Pond to 23.8 at the PCP for composite sediments (Table 8). The highest sediment concentration was 751 mg/kg at the PCP from the composite sample (Table E-18). Pit 4 had a HQ of less than 1.0. The Central Drainage was the only AOI in the PIA that retained Cu as a COPC with a HQ of 2.9 for the grab sediments (Table 8). All other AOIs in the PIA had HQs less than 1.0 for the composite and grab sediments (Tables 8 and 9), eliminating Cu as a COPC.

Iron

The sediment BM value for screening Fe was 10,000 mg/kg. Iron is retained as a COPC at all AOIs in the MA with HQs exceeding 1.0 but less than 10 (Tables 8 and 9). The Blood Pool had the highest HQ of 6.7 with a maximum concentration of 67,400 mg/kg for the grab sediment (Table E-17). With the exception of Upper Blue Creek, Fe is retained as a COPC at all AOIs in the PIA with HQs exceeding 1.0 but less than five for the composite and grab sediments. The highest HQs in the PIA were 3.4 at Northeastern Drainage for the grab sediments and 3.1 at Middle Blue Creek for the composite sediments. Upper Blue Creek had a HQ of less than 1.0 for grab and composite sediments (Tables 8 and 9), eliminating Fe as a COPC at this AOI.

Magnesium

The sediment BM for screening Mg was 6,100 mg/kg. Magnesium is being retained as a COPC at each of the AOIs in the MA with HQs ranging from 1.2 to 1.8 for the grab sediments (Table 9). The maximum concentration of Mg was found at Pit 3 at 11,100 mg/kg (Table E-15). Only three AOIs in the PIA – Upper Eastern Drainage, Lower Blue Creek, and FDR Lake - had HQs exceeding 1.0 for grab sediments (Table 9). The maximum concentrations of Mg at these three locations ranged from 6,170 mg/kg to 6,700 mg/kg (Tables E-22, E26, E-27). All the remaining AOIs in the PIA had HQs less than 1.0 (Tables 8 and 9), eliminating Mg as a COPC.

Manganese

The sediment BM value for screening Mn was 736 mg/kg. Manganese is retained as a COPC in the MA at Pits 3 and 4, PCP, and Outfall Pond with HQs exceeding 1.0 but less than 10 for grab sediment (Table 9). The HQ was less than 1.0 at the Blood Pool. Manganese is retained as a COPC in the PIA at five of the drainages – Western, Northeastern, Central, Upper Eastern and Lower Eastern – with HQs ranging from 1 to 46 for composite and grab sediments (Tables 8 and 9). The Lower Eastern Drainage had a maximum concentration of 24,300 mg/kg for Mn in the grab sediment (Table E-23). Three drainages – Far Western, Southwestern, and

Northern Drainages – had HQs less than 1.0 based on the composite sediments (Tables 8 and 9). The grab sediments sampled at the Upper, Middle, and Lower Blue Creek had higher sediment concentrations than the composite sediments resulting in HQs of 10.2, 86 and 5.0, respectively. Middle Blue Creek with a HQ of 86 had a maximum concentration of 63,300 mg/kg for grab sediment (Table E-25). The HQ was less than 1.0 for the composite and grab sediments at FDR Lake, eliminating Mn as a COPC at this AOI.

Nickel

The sediment BM value for screening Ni was 22.7 mg/kg. Nickel is retained as a COPC at all AOIs in the MA for grab sediments (Table 9). The highest HQ of 33 at the PCP had a maximum concentration of 757 mg/kg (Table E-18). Nickel is retained as a COPC at five of the drainages - Western, Northeastern, Central, Upper Eastern, and Lower Eastern - based on composite and grab sediments with HQs ranging from 1.2 to 23 (Tables 8 and 9). Three drainages – Far Western, Southwestern, and Northern - had HQs less than 1.0 for the composite sediments, eliminating Ni as a COPC at these AOIs. Nickel is retained as a COPC at Upper, Middle, and Lower Blue Creek with HQs of 1.4, 20.3, and 2.3 based on the sediment grab samples, respectively. Middle Blue Creek with a HQ of 20.3 had a maximum concentration of 460 mg/kg for the grab sediments (Table E-25). The HQ was less than 1.0 for grab and composite sediments for FDR Lake.

Selenium

The sediment BM value for screening Se was 0.1 mg/kg. Selenium was retained as a COPC at all AOIs in the MA or PIA based on the composite and grab sediments since either the HQs exceeded 1.0 or the BM value was less than the SDL (Tables 8 and 9).

Silver

The sediment BM value for screening Ag was 0.5 mg/kg. Silver is retained as a COPC in the MA at Pit 3, Blood Pool, PCP, and Outfall Pond since the BM was less than the SDL for grab sediments (Table 9). The SDLs for these MA samples ranging between 0.52 and 0.6 mg/kg were just above the 0.5 mg/kg BM value (Tables E-15, E-17 to E-19). Two AOIs in the PIA - Upper Eastern Drainage and Lower Blue Creek - retained Ag as a COPC with a HQ of 1.3 and a BM value less than the SDL, respectively (Table 9) . For the remaining AOIs in the PIA either the HQ was less than 1.0 or the BM was greater than the SDL for the composite and grab sediments (Tables 8 and 9), eliminating Ag as a COPC at these AOIs.

Uranium

The sediment BM value for screening U was 17 mg/kg. Uranium is retained as a COPC at all AOIs in the MA and PIA except the FDR Lake based on composite and grab sediments (Tables 8 and 9). For the MA, the highest HQ of 340 occurred at the PCP with a maximum concentration of 5,780 mg/kg (Table E-18). The lowest HQ in the MA was 6.1 at the Blood Pool (Table 9). For the drainages, the HQs ranged from 1.2 at the Northern Drainage with composite sediment to 214 at the Central Drainage with the grab sediment. The maximum concentration of U at the Central Drainage was 3,640 mg/kg for grab sediment (Table E-21). The HQs were greater than 1.0 but less than 10 at the Upper, Middle, and Lower Blue Creek AOIs. The HQ was less than 1.0 at FDR Lake for the composite and grab sediments (Tables 8 and 9), eliminating U as a COPC at this AOI.

Vanadium

Vanadium is being retained as a COPC for all AOIs since a BM value was not available. Vanadium concentrations did not exhibit a wide variation between the AOIs of the MA and PIA. Maximum sediment concentrations for V in the MA ranged from 16.3 mg/kg at PCP (Table E-18) to 66.3 mg/kg at the Blood Pool (Table E-17). The drainages had maximum sediment concentrations ranging from 12.8 mg/kg for grab sediment at the Western Drainage (Table E-2) to 44.8 mg/kg for composite sediment at the Northeastern Drainage (Table E-5). The maximum sediment concentrations for Upper Blue Creek, Middle Blue Creek, Lower Blue Creek, and FDR Lake were determined for the grab sediment samples with concentrations ranging from 9.2 mg/kg (Table E-10) at Upper Blue Creek to 25.9 mg/kg at Middle Blue Creek (Table E-11).

Zinc

The sediment BM value for screening Zn was 121 mg/kg. Zinc is retained as a COPC in the MA at Pit 3, PCP, and Outfall Pond with HQs exceeding 1.0 but less than 10 for the grab sediment (Table 9) . The maximum concentration of Zn was 995 mg/kg at the PCP (Table E-18). Zinc is retained as a COPC at five AOIs in the PIA including Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Middle Blue Creek, and FDR Lake with HQs exceeding 1.0 but less than five for the composite and grab sediments (Tables 8 and 9). The remaining AOIs in the PIA – Far Western, Western, Northern, Northeastern, and Southwestern - had HQs less than 1.0 for either grab or composite sediments (Tables 8 and 9), eliminating Zn as a COPC.

2.4.1.3 Riparian Sediments

Risk estimations of the metals in riparian sediments were screened using the same BM values as the instream sediments. Tables F-1 to F-6 present the data summaries for the screening of the riparian sediments for each AOI that includes the number of samples and number of analytical detections for each analyte, the minimum and maximum values for each analyte, the central tendency of the dataset for each analyte, the BM value, the HQ, and the rationale for retaining the COPC. Table 10 provides a summary of the COPCs being retained by AOI for the riparian sediments.

Riparian habitats only exist in the PIA. Six riparian AOIs were identified for the screening designated as Western Drainage, Central Drainage, Upper and Lower Eastern Drainages, Middle Blue Creek, and Lower Blue Creek. A general description of the contents of these tables with an emphasis on what analytes are being retained as COPCs follows.

Six analytes – Ba, Cr, Hg, Pb, Ag, and Tl – are not being retained as COPCs based on the screening of the riparian sediments indicating a negligible risk to the AOIs in PIA. The HQs were all less than 1.0 for Ba, Cr, Pb, and Tl at each AOI. The BM for Hg was greater than the SDL at each AOI. For Ag either the HQ was less than 1.0 or the BM value was greater than the SDL (Tables F-1 to F-6).

Aluminum

Aluminum is retained as a COPC at each of the riparian AOIs except Lower Blue Creek (Table 10). The HQs for the drainages and Middle Blue Creek ranged from 1.3 at Middle Blue Creek to 3.2 at the Central Drainage. The highest maximum concentration for Al at the Central Drainage was 30,500 mg/kg (Table F-2). Lower Blue Creek had a HQ of less than 1.0 (Table F-6), eliminating Al as a COPC at this AOI.

Antimony

Antimony is retained as a COPC at each of the riparian AOIs. The HQs ranged from 1.3 to 2.4 at five of the AOIs including Western Drainage, Central Drainage, Upper Eastern Drainage, and Middle and Lower Blue Creek (Table 10). The highest maximum concentration for Sb at the Central Drainage was 1.2 mg/kg (Table F-2). The BM was less than the SDL at the Lower Eastern Drainage (Table F-4).

Arsenic

Arsenic is retained as a COPC at three riparian AOIs – Central Drainage, and Upper and Lower Eastern Drainages – with HQs ranging from 1.0 to 3.9 (Table 10). The highest maximum concentration for As at the Central Drainage was 37.7 mg/kg (Table F-2). The HQs were less than 1.0 at Western Drainage, and Middle and Lower Blue Creek (Tables F-1, F-5, and F-6), eliminating As as a COPC at these AOIs.

Beryllium

Beryllium is retained as a COPC at all riparian AOIs except Lower Blue Creek (Table 10). The highest HQ of 14.7 was at Central Drainage with a maximum concentration of 10.3 mg/kg as Be (Table F-2). Lower Blue Creek had a HQ less than 1.0, eliminating Be as a COPC at this AOI.

Cadmium

Cadmium is retained as a COPC at three riparian AOIs – Central Drainage, Lower Eastern Drainage, and Middle Blue Creek – with HQs of 4.3, 10.9, and 1.2, respectively (Table 10). The highest maximum concentration for Cd at the Lower Eastern Drainage was 10.8 mg/kg (Table F-4). HQs were less than 1.0 at the Western Drainage, Upper Eastern Drainage, and Lower Blue Creek (Tables F-1, F-3, and F-6), eliminating Cd as a COPC at these AOIs.

Cobalt

Cobalt is retained as a COPC at Central Drainage and Lower Eastern Drainage with HQs of 5.7 and 1.5, respectively (Table 10). The HQs were less than 1.0 at Western Drainage, Upper Eastern Drainage, and Middle and Lower Blue Creek (Tables F-1, F-3, F-5 and F-6), eliminating Co as a COPC at these AOIs.

Copper

Copper is retained as a COPC at Central Drainage with a HQ of 2.2 and maximum concentration of 68.5 mg/kg (Tables 10 and F-2). The HQs were less than 1.0 at the Western Drainage, Upper and Lower Eastern Drainages, and Middle and Lower Blue Creek (Tables F-1, F-3 to F-6), eliminating Cu as a COPC at these AOIs.

Iron

Iron is retained as a COPC at all riparian AOIs with HQs ranging from 1.4 to 2.9 (Table 10). Central Drainage had the highest maximum concentration for Fe at 29,200 mg/kg (Table F-2).

Magnesium

Magnesium is retained as a COPC at the Central Drainage and the Upper Eastern Drainage with HQs of 1.2 and 1.1, respectively (Table 10). The HQs were less than 1.0 at Western Drainage, Lower Eastern Drainage, and Middle and Lower Blue Creek (Tables F-1, F-4 to F-6), eliminating Mg as a COPC at these AOIs.

Manganese

Manganese is retained as a COPC at each of the riparian AOIs except Lower Blue Creek (Table 10). Lower Eastern Drainage had the highest HQ of 23.2 with a maximum concentration of 17,100 mg/kg as Mn (Table F-4). The HQ was less than 1.0 at Lower Blue Creek (Table F-6), eliminating Mn as a COPC at this AOI.

Molybdenum

Since no BM value for screening Mo was available, Mo was retained as a COPC at each of the AOIs. The drainages had higher maximum concentrations of Mo than the Blue Creek AOIs ranging from 3.3 mg/kg at Upper Eastern Drainage to 9.0 mg/kg at the Lower Eastern Drainage (Tables F-1 to F-6). Maximum concentrations of Mo at Middle and Lower Blue Creek were 1.4 mg/kg and 0.21 mg/kg, respectively (Tables F-5 and F-6).

Nickel

Nickel is retained as a COPC at four AOIs – Central Drainage, Upper and Lower Eastern Drainages, and Middle Blue Creek (Table 10). Central Drainage and Lower Eastern Drainage had HQs of 12.4 and 10.4 with maximum concentrations of 281 mg/kg and 237 mg/kg, respectively (Tables F-3 and F-4). The HQs at Upper Eastern Drainage and Middle Blue Creek were 1.1 and 2.3, respectively. The HQs were less than 1.0 for Western Drainage and Lower Blue Creek (Tables F-1 and F-6), eliminating Ni as a COPC at these AOIs.

Selenium

Selenium is retained as a COPC at each of the riparian AOIs. Western Drainage had the highest HQ of 27 with a maximum concentration of 2.7 mg/kg (Table F-1). The HQs ranged between 2.6 and 5.9 at the Central Drainage, Lower Eastern Drainage, and Middle and Lower Blue Creek (Table 10). The BM was less than the SDL at Upper Eastern Drainage (Table F-3).

Uranium

Uranium is retained as a COPC at each of the riparian AOIs except Lower Blue Creek (Table 10). Central Drainage had the highest HQ of 134 with a maximum concentration of 2,271 mg/kg (Table F-2). The HQ was less than 1.0 at Lower Blue Creek (Table F-6), eliminating U as a COPC at this AOI.

Vanadium

Since no BM value for screening V was available, V was retained as a COPC at each of the AOIs. Vanadium concentrations in the drainages were approximately twice the amount found in the Blue Creek samples. Highest concentrations ranged from 30.4 mg/kg at Upper Eastern Drainage to 48.5 mg/kg at the Western Drainage and from 21.5 mg/kg at Middle Blue Creek to 16.3 mg/kg at Lower Blue Creek (Tables F-1 and F-6).

Zinc

Zinc is retained as a COPC at Central Drainage and Lower Eastern Drainage with HQs of 7.2 and 2.5, respectively (Table 10). The HQs were less than 1.0 for the remaining AOIs (Tables F-1, F-3, F-5 and F-6), eliminating Zn as a COPC.

2.4.1.4 Soils: Surface and Subsurface Soils

Risk estimations of the metals in soils were screened based on surface and subsurface sampling. For each type of soil sampling, summary tables provide the number of samples and number of analytical detections for each analyte, the minimum and maximum values for each analyte, the central tendency of the dataset for each analyte, the BM value, the HQ, and the rationale for retaining the COPC. Tables G-1 to G-6 present the data summaries for the screening of surface level soils for each AOI and Tables G-7 to G-11 present the data summaries for the screening of sub-surface soils for each AOI. Tables 11 and 12 provide a summary of the COPCs being retained by AOI for the surface soils and the subsurface soils, respectively.

The surface soil sampling was performed at five AOIs including the MA, the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. Subsurface samples were collected at four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. A general description of the contents of these tables with an emphasis on what analytes are being retained as COPCs follows.

Five analytes – Sb, Ba, Be, Hg, and Ag – are not being retained as COPCs based on the screening of the surface and subsurface soils indicating a negligible risk of these analytes both in the MA and PIA (Tables 11 and 12). For each of these analytes either the HQs were less than 1.0 or the BM was greater than the SDL for the surface and sub-surface soils with one exception for Hg. One of the 12 samples analyzed for Hg at the East Haul Road detected a concentration of 0.1 mg/kg and a HQ equal to 1.0 (Table G-4).

Aluminum

The BM value for screening Al in soils was 50 mg/kg. Aluminum is being retained as a COPC at all AOIs in the MA and PIA with HQs that exceeded 100 (Tables 11 and 12). Maximum concentrations for the surface level soils for all AOIs ranged from 15,200 mg/kg at the West Haul Road (Table G-5) to 33,700 mg/kg at the MA (Table G-1). The maximum Al concentrations for the subsurface soils were lower than the concentrations for the surface soils with concentrations ranging from 9,900 mg/kg at the West Haul Road to 22,100 mg/kg at the Northeastern PIA.

Arsenic

The soil BM value for screening As was 10 mg/kg. Arsenic was retained as a COPC for the MA with a HQ of 23.9 (Tables 11). Northeastern PIA, East Haul Road, and West Haul Road were also retained with HQs exceeding 1.0 for the surface soils (Table 11). The highest concentrations of As were detected at the MA at a concentration of 239 mg/kg and at the East Haul Road at 92.4 mg/kg (Tables G-1 and G-4). For the Southwestern PIA , the HQs for the surface and sub-surface soils were less than 1.0. For the sub-surface soils HQs exceeded 1.0 but less than ten at Northeastern PIA and East Haul Road (Table 12).

Cadmium

The soil BM value for screening Cd was 3 mg/kg. Cadmium is retained as a COPC in the MA but not at any of the AOIs in the PIA (Tables 11 and 12). The HQ for Cd in the MA was 1.2 for the surface soil. All HQs were less than 1.0 for the AOIs in the PIA for the surface and subsurface soils.

Chromium

The soil BM value for screening Cr was 0.4 mg/kg. Chromium is retained as a COPC for all AOIs based on the surface and subsurface soils (Tables 11 and 12). The MA had the highest HQ of 165 in the surface soil with a maximum concentration of 66 mg/kg (Table G-1). The HQs were greater than 10 for the surface and subsurface soils at each of the AOIs in the PIA (Tables 11 and 12). The Northeastern PIA had the highest HQ of 73 with a maximum concentration of 29.1 mg/kg as Cr for the surface soil (Table G-2).

Cobalt

The soil BM value for screening Co was 20 mg/kg. Cobalt was retained as a COPC at the MA and East Haul Road since the HQs were equal to 1.0 for the surface soils (Table 11). The HQs were less than 1.0 for the remaining AOIs (Tables 11 and 12).

Copper

The soil BM value for screening Cu was 50 mg/kg. Copper was retained as a COPC at the MA with a HQ of 1.7 and a maximum concentration of 83 mg/kg for the surface soil (Table G-1). Copper was retained as a COPC at East Haul Road and West Haul Road with HQs of 1.2 and 1.0 for the surface soils, respectively. The HQs were less than 1.0 at Northeastern and Southwestern PIAs for the surface soils and at each AOI in the PIA for the subsurface soils.

Iron

The soil BM value for screening Fe was 200 mg/kg. Iron was retained as a COPC for each AOI based on the surface and subsurface samples. The highest HQ of 327 was found at the MA with a maximum concentration of 65,300 mg/kg (Table G-1). For the AOIs in the PIA the HQs for the surface and subsurface soils exceeded 50 at the Southwestern PIA and West Haul Road and exceeded 100 at Northeastern PIA and East Haul Road (Tables 11 and 12).

Lead

The soil BM value for Pb was 50 mg/kg. Lead was retained as a COPC at the MA but not at any of the AOIs in the PIA (Tables 11 and 12). The HQ for Pb at the MA was 1.7 with a maximum concentration of 84 mg/kg for the surface soils (Table G-1). The HQs were less than 1.0 for the remaining AOIs in the PIA (Tables 11 and 12).

Magnesium

Magnesium is retained as a COPC at each AOI in the MA and PIA since no BM value was available. The highest surface concentrations occurring at the MA and Northeastern PIA were 10,500 mg/kg and 13,900 mg/kg, respectively (Tables G-1 and G-2). For the subsurface soils maximum Mg concentrations for the AOIs in the PIA ranged from 2,460 mg/kg to 8,360 mg/kg (Tables G-7 to G-10).

Manganese

The soil BM value for screening Mn was 100 mg/kg. Manganese was retained as a COPC in the MA and PIA based on the surface and subsurface soils (Tables 11 and 12). The MA had the highest HQ of 51.9 with a maximum concentration of 5,190 mg/kg (Table G-1). For the AOIs in the PIA, the HQs for the surface soils ranged between 6.2 at the Southwestern PIA to 19.9 at the Northwestern PIA (Table 11). The AOIs in the PIA had HQs for Mn ranging between 4.7 at West Haul Road and 12.7 at Northeastern PIA for the subsurface soils (Table 12).

Molybdenum

The soil BM value for Mo was 2 mg/kg. Molybdenum was retained as a COPC at the MA with a HQ of 16 and a maximum concentration of 31.9 mg/kg for the surface soil (Table G-1). Molybdenum was retained as a COPC at the West and East Haul Road with HQs of 2.5 and 3.7 for the surface soils, respectively (Table 11). The HQs were less than 1.0 for the surface soils at Northeastern and Southwestern PIAs (Tables G-2 and G-3), eliminating Mo as a COPC at these two AOIs. For the subsurface soils one AOI had a HQ of 2.2 at East Haul Road with the remaining AOIs having HQs less than 1.0 (Table 12).

Nickel

The soil BM value for Ni was 30 mg/kg. Nickel was retained as a COPC at the MA with a HQ of 1.5 and a maximum concentration of 44 mg/kg for the surface soil (Table G-1). Nickel was retained as a COPC at East Haul Road with HQ of 1.0. The remaining AOIs – Northeastern and Southwestern PIAs and West Haul Road – had HQs less than 1.0 for the surface soil (Table 11), eliminating Ni as a COPC at these AOIs. All of the AOIs in the PIA for the subsurface soils had HQs less than 1.0 for Ni (Table 12).

Selenium

The soil BM value for Se was 1.0 mg/kg. Selenium was retained as a COPC at the MA but not at any of the AOIs in the PIA (Tables 11 and 12). The HQ at the MA was 90 with a maximum concentration of 90 mg/kg for the surface soil (Table G-1). The HQs were less than 1.0 at all AOIs in the PIA for the surface and subsurface soils (Tables 11 and 12).

Thallium

The soil BM value for Tl was 1.0 mg/kg. Thallium is retained as a COPC at the MA but not at any of the AOIs in the PIA (Tables 11 and 12). The HQ for Tl at the MA was 3.0 with a maximum concentration of 2.5 mg/kg for the surface soils (Table G-1). The HQs were less than 1.0 for the AOIs in the PIA for the surface and subsurface soils.

Uranium

The soil BM value for screening U was 5.0 mg/kg. Uranium was retained as a COPC in the MA and each of the AOIs in the PIA based on the surface and subsurface samples (Tables 11 and 12). The MA had the highest HQ of 96.4 with a maximum concentration of 482 mg/kg (Table G-1). For the surface soils in the

PIA, the HQs were higher at the East and West Haul Roads (17.7 and 52, respectively) than the Northeastern and Southwestern PIAs (both having HQs of 3.1) (Table 11). West Haul Road had the highest maximum concentration in the PIA of 262 mg/kg (Table G-5). The HQs for the subsurface soils exceeded 1.0 but less than 10 for all of the AOIs in the PIA (Table 12). East Haul Road had the highest HQ of 9.6 with a maximum concentration of 47.8 mg/kg for the subsurface soil (Table G-4).

Vanadium

The soil BM value for screening V was 2.0 mg/kg. Vanadium was retained as a COPC in the MA and each of the AOIs in the PIA based on the surface and subsurface soils (Tables 11 and 12). The MA had the highest HQ of 66 with a maximum concentration of 132 mg/kg for the surface soil (Table G-1).

Zinc

The soil BM value for screening Zn was 50 mg/kg. Zinc was retained as a COPC in the MA and each of the AOIs in the PIA based on the surface soils (Tables 11 and 12). The MA had the highest HQ of 7.6 with a maximum concentration of 381 mg/kg (Table G-1). The HQs ranged between 1.2 and 2.3 for the surface soils for the remaining AOIs. East Haul Road had a HQ of 1.0, while the remaining AOIs had HQs less than 1.0 for the subsurface soils.

2.4.1.5 Total Ionizing Radiation

Risk of radionuclides to aquatic, riparian, and terrestrial biota is evaluated following the USDOE guidance (USDOE 2002). Section 2.3.2.3 presents the methodology and criteria for screening for total ionizing radiation (TIR) using the sum-of-the-fractions approach. Six site-related radioisotopes – ^{226}Ra, ^{228}Ra, ^{232}Th, ^{234}U, ^{235}U, and ^{236}U – were measured in surface waters, instream sediments, riparian sediments, and soils in the MA and PIA. Following the screening methodology, the maximum concentration detected of each radionuclide is compared to the specific BCG of that radionuclide for each environmental medium. The sum-of-the fractions approach combines the exposure media to derive the TIR exposure to aquatic, riparian or terrestrial systems.

For aquatic systems risk is evaluated by combining exposure of instream sediments and surface water. Since two types of samples were collected for the instream sediments (composite and grab), both types of sediment samples were screened separately with the surface water samples collected in that AOI. For riparian systems risk is evaluated by combining exposure of riparian sediments and surface water. For terrestrial systems risk is evaluated by combining exposure of soils and surface water for both plants and animals, respectively. Surface soils and subsurface soils were screened separately and compared with the surface water nearest to the sampling site of the soils. For the MA soils, Pit 3 was used as the medium for the surface water exposure.

For each type of system (aquatic, riparian, or terrestrial), the maximum concentrations in each media were used for screening. If data were not available for a particular AOI or media, then the concentrations of the radionuclides were not calculated. If the case where the radionuclides were not detected, the detection limits for the non-detected radionuclide were substituted into the sum-of-the-fractions process.

The overall exposure for aquatic and terrestrial backgrounds were calculated using the sum-of-the-fractions process in the same manner as used for the AOIs using the maximum concentrations of the radionuclides. The results of the background calculations could then be used to compare with the AOIs in the MA and PIA.

2.4.1.5.1 Instream Sediments and Surface Waters

Tables H-1 to H-11 (Appendix H) present the calculations for the composite sediments plus surface water for each AOI and Tables H-12 to H-25 present the calculations for the grab sediments plus surface water for each AOI. Table 13 summarizes the TIR exposure for both the composite and grab instream sediments plus surface water.

In the MA, all AOIs exceeded the TIR criterion of 1.0 rad/day. The highest TIR exposures were observed for Pit 3 and the PCP at 88.5 rad/day and 1 rad/day, respectively (Table 13). TIR for the remaining AOIs in the MA ranged from 1.1 rad/day to 26.8 rad/day. Only the FDR Lake and Lower Blue Creek had TIR exposures of less than 1.0 rad/day for both the composite and grab sediment samples (Table 13). TIRs for the other AOIs in the PIA ranged from 1.0 rad/day at the Western Drainage to 4.8 rad/day at the Northeastern Drainage for the composite sediments with surface water and from 1.0 rad/day at the Western Drainage to 4.0 rad/day at the Central Drainage for the grab sediments with surface water. It can be observed from Table 13 that the TIR contributed by surface water is driving the risk with the rad/day exceeding 1.0 for all AOIs, except Lower Blue Creek, FDR Lake, and background.

2.4.1.5.2 Riparian Sediments and Surface Waters

Tables H-26 to H-31 (Appendix H) present the calculations for the riparian sediments plus water for each AOI. Table 14 summarizes the results of the TIR exposures. All riparian PIAs had TIR exceeding 0.1 rad/day. The highest TIR of 0.4 rad/day was at Central Drainage. Similar to the instream sediments plus surface water, the surface water is driving the risk for the riparian sediments with rad/day exceeding the 0.1 rad/day criteria for riparian animals.

2.4.1.5.3 Soil and Surface Waters

Tables H-32 to H-37 (Appendix H) present the calculations for the surface soils plus surface water to terrestrial animals and Tables H-38 to H-42 present the calculations for the subsurface soils plus surface water to terrestrial animals for each AOI. Tables H-43 to H-48 (Appendix H) present the calculations for the surface soils plus surface water to terrestrial plants and Tables H-49 to H-53 present the calculations for the subsurface soils plus surface water to terrestrial plants for each AOI. Table 15a summarizes the results of TIR exposure for terrestrial animals and Table 15b summarizes the results of TIR exposure for terrestrial plants.

The TIR exposures for surface soils plus water exceeded the 0.1 rad/day criterion for terrestrial animals at four AOIs – MA, Northeast PIA, East Haul Road, and West Haul Road. The MA had the highest TIR of 2.1 rad/day for terrestrial animals. All of the TIR for the subsurface soils plus water were less than 0.1 rad/day for terrestrial animals except the East Haul Road (Table 15a).

Only the MA had a TIR exposure that exceeded the 1.0 rad/day criterion for terrestrial plants (Table 15b).

2.4.2 Risk Description of Screening Level Ecological Risk Assessment

A summation of the screening evaluation for assessing risk to the three ecosystems - aquatic, riparian and wetland, and terrestrial - at the Midnite Mine site is as follows:

2.4.2.1 Aquatic Ecosystems

Four COPCs - Sb, As, Tl, and V – are not being retained for the surface waters (as total metals or dissolved metals) in the MA and PIA. A total of 17 COPCs as total metals in surface waters are being retained for the BERA in the MA and PIA (Table 6). The COPCs being retained for surface waters as total metals are: Al, Ba, Be, Cd, Co, Cr, Cu, Fe, Pb, Mg, Mn, Hg, Ni, Se, Ag, U, and Zn.

A total of 13 COPCs as dissolved metals in surface waters are being retained in the MA and PIA (Table 7). The COPCs being retained for surface waters as dissolved metals are: Ba, Be, Cd, Cr, Co, Cu, Pb, Mg, Mn, Hg, Ni, Ag, and Zn.

All COPCs being retained, as dissolved metals, are also being retained as total metals. Aluminum, Fe, Se, and U retained as COPCs as total metals were not analyzed as dissolved metals.

All AOIs in the MA and PIA are at risk based on the presence of COPCs analyzed in the surface waters and are retained for further investigation (Tables 6 and 7). Three AOIs in the MA - Pit 3, Blood Pool, and PCP - retained all 17 COPCs as total metals. The remaining two AOIs in the MA - Pit 4 and Outfall Pond -had fewer COPCs retained and the HQs were one to three orders of magnitude lower for most of the COPCs. One exception was Ba for the Outfall Pond with a higher HQ relative to the other AOIs. Pit 4 has 12 COPCs as total metals being retained and the Outfall Pond has nine COPCs being retained.

Likewise, the HQs for most of the COPCs for the AOIs in the PIA were often one to three orders of magnitude lower relative to the HQs at Pit 3, Blood Pool, and PCP. Certain AOIs in the PIA, including Central Drainage and Northeastern Drainages, had relatively higher HQs for several COPCs. The Central Drainage had the highest HQs for Cd, Co, Cu, Mn, and Ni relative to the other AOIs in the PIA. The Northeastern Drainage had the highest HQs for Al, Ba, Fe, Pb, and U relative to the other AOIs in the PIA. The highest HQs for U were at Central and Northeastern Drainages. Upper Blue Creek has eight COPCs as total metals being retained compared to Middle Blue Creek and Lower Blue Creek with 14 and 13 COPCs being retained, respectively.

Four COPCs - Cr, Hg, Pb, and Tl – are not being retained for the instream sediments (as composite or grab samples) in the MA and PIA. A total of 17 COPCs as metals in grab sediments are being retained for the BERA in the MA and PIA (Table 9). The COPCs being retained are: Al, Sb, As, Ba, Be, Cd, Co, Cu, Fe, Mg, Mn, Ni, Se, Ag, U, V, and Zn.

A total of 13 COPCs as metals in composite sediments are being retained for the BERA in the MA and PIA (Table 8). The COPCs being retained are: Al, As, Be, Cd, Co, Cu, Fe, Mn, Ni, Se, U, V, and Zn. All COPCs being retained from the composite sediments are also being retained from the grab sediments. Since no benchmark was available for V, it is being retained as a COPC.

All AOIs in the MA and PIA are at risk based on the presence of COPCs determined in the sediments and are retained for further investigation (Tables 8 and 9). Amongst the AOIs in the MA, PCP had the highest number of COPCs (total of 17) and the highest HQs for Al, Ba, Be, Cd, Co, Cu, Mn, Ni, U, and Zn based on grab sediments (Table 9). Pit 3 and the Outfall Pond ranked second and third in the number of COPCs being retained with 16 and 15 COPCs, respectively. The number of COPCs being retained at Pit 4 and the Blood Pool were 12 and 13, respectively.

The Central Drainage has 14 COPCs being retained as grab sediments. The highest HQ for U in the PIA was at the Central Drainage. Both the Upper and Lower Eastern Drainages had a total of 13 COPC being retained. Middle Blue Creek and Lower Blue Creek had 14 and 12 COPCs as grab sediments being retained, respectively. Upper Blue Creek and FDR Lake had the least number of COPCs being retained as grab sediments with seven and eight COPCs, respectively.

Total ionizing radiation based on the surface water plus instream sediments exposures exceeded the recommended U.S. DOE dose criterion of 1.0 rad/day for the protection of aquatic animals in the MA and at most of the AOIs within the PIA (Table 13). Surface water exposures are driving the risk with higher levels of TIR. The exposures defined by maximum radionuclide concentrations in the MA are considerably more elevated than in the PIA. Most of the AOIs in the PIA have TIR exposures that are very close to the background TIR.

All nine assessment endpoints selected for this SLERA are considered at risk based on COPCs and TIR in the surface water and sediments exceeding the screening level criteria.

2.4.2.2 Riparian and Wetland Ecosystems

Riparian habitats only exist in the PIA. Six COPCs - Ba, Cr, Hg, Pb, Ag, and Tl – are not being retained for the BERA for the riparian sediments. A total of 16 COPCs are being retained for the six riparian AOIs (Table 10). The COPCs being retained are: Al, Sb, As, Be, Cd, Co, Cu, Fe, Mg, Mn, Mo, Ni, Se, U, V, and Zn.

All riparian AOIs in the PIA are at risk based on the presence of COPCs determined in the riparian sediments and are retained for further investigation (Table 10). The Central Drainage had the highest number of COPCs retained for a total of 16. Lower Eastern Drainage followed by the Upper Eastern Drainage ranked second and third in the number of COPCs being retained with totals of 14 and 12 COPCs, respectively. Middle Blue Creek and the Western Drainage ranked fourth and fifth for the number of COPCs of 11 and 9 being retained, respectively. Lower Blue Creek had the least number of COPCs being retained with five COPCs.

Total ionizing radiation exposure based on surface water plus riparian sediments exposures exceeds the recommended U.S. DOE dose criterion of 0.1 rad/day for the protection of riparian animals in the PIA (Table 14).

Assessment endpoints # 4, 5, 8, and 9 selected for this SLERA are exposed to COPCs and TIR in the surface waters and/or riparian sediments in the PIA that exceed the screening level criteria. Hence, these assessment endpoints are considered at risk.

2.4.2.3 Terrestrial Ecosystems

Five COPCs - Sb, Ba, Be, Hg, and Ag – are being retained for the surface and subsurface soils in the MA and PIA (Tables 11 and 12). A total of 17 COPCs for the surface soils are being retained for the BERA in the MA and PIA (Table 11). These are: Al, As, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Th, U, V, and Zn.

A total of 10 COPCs for the subsurface soils are being retained as COPCs in the MA and PIA (Table 12). These are: Al, As, Cr, Fe, Mg, Mn, Mo, U, V, and Zn.

All COPCs being retained from the subsurface soils are also being retained for the surface soils. Since no BM was available for Mg, it is being retained as a COPC.

All AOIs in the MA and PIA are at risk based on the presence of COPCs determined in the soils and are retained for further investigation (Tables 11 and 12). The MA had the highest number of COPCs being retained with a total of 17 (Table 11). Four COPCs – Cd, Pb, Se, and Tl – were only retained for the MA. The East Haul and West Haul Road ranked second and third for the number of COPCs retained for the surface soils with totals of 14 and 11 COPCs, respectively. The number of COPCs retained at the Northeastern PIA and Southwestern PIA are nine and eight, respectively. The subsurface soils retained a lower number of COPCs than the surface soils in the PIA (Table 12). East Haul Road had the highest number of COPCs retained with a total of ten.

The TIR exposure based on the surface water plus surface soil exposures exceeded the recommended U.S. DOE dose criterion of 0.1 rad/day for the protection of terrestrial animals in the MA, the Northeast PIA, and the Haul Roads (Table 15a). Only the subsurface soils for the East Haul Road had TIRs that exceeded the 0.1 rad/day criteria for terrestrial animals (Table 15a). Only the MA exceeded the 1.0 rad/day criteria for terrestrial plants (Table 15b).

Assessment endpoints # 6, 7, 8, and 9 selected for this SLERA are exposed to COPCs and TIR in the soils and/or surface waters in the MA and PIA that exceed the screening level criteria. Hence, these assessment endpoints are considered at risk.

2.5 Assumptions

This SLERA evaluates exposure to contaminants (metals and radionuclides) through surface water, instream sediments, riparian sediments, and soils. There are factors inherent in the ERA process which require assumptions which need to be considered when interpreting results including the following:

- A HQ equal to or greater than 1.0 indicates there is insufficient information to conclude negligible risk from exposure to contaminants at concentrations measured on-site. A HQ less than 1.0 does not indicate a lack of risk, but suggests that there is a high degree of confidence that minimal risk exists for the given contaminant, since BM values are based on the lowest measurable concentration considered to be protective of the most sensitive organism in a medium.

- For worst-case scenarios, the exposure value for each contaminant used in risk estimations was assumed to be present throughout the specific AOI and encountered at the predicted concentration all of the time.

- Maximum concentrations of contaminants (metals and radionuclides) in water, instream sediments, riparian sediments, and soils were used for the risk calculations. The bioavailability of each contaminant was assumed to be 100%. No assumptions were considered regarding partitioning or the ionic species of the metals.

- All BM values were based on the more conservative of the available published values for each medium. These BMs were derived by methods that have proved to be conservative in practice. For the surface water, chronic water quality criteria (WQC) defined the BM values. In addition, the hardness-dependent metals - Cd, Cu, Pb, Ni, and Zn - were adjusted to BM values at a water hardness of 30 mg/L $CaCO_3$. Sediment BM values for most of the analytes were derived from either the consensus-based TEC values (MacDonald, *et al.* 2000) or the lowest SQG value (EVS 1998). Soil BMs were based on the lowest BM available to soil receptors following ORNL publications (Efroymson *et al.* 1997a, 1997b).

- COPCs were retained for further investigation in the BERA if the HQ was equal to or greater than 1.0, or a BM value was not available, or the BM value was below the sample detection limit.

- Exposure of TIR was based on comparing media-specific BCGs with maximum radionuclide concentrations that would be considered conservative for the protection of populations, but not necessarily for communities or individuals.

- Background concentrations were not considered in the SLERA.

2.6 Conclusions

The objectives of this SLERA included the following:

- Identify the COPCs that have negligible risk with HQs less than 1.0,
- Identify the COPCs that are to be retained for the BERA for further evaluation,
- Screen for the risk of TIR exceeding the recommended dose criterion to aquatic, riparian, and terrestrial systems,
- Identify the AOIs at risk, and
- Identify the assessment endpoints at risk.

The Risk Description section (Section 2.4.2) summarized the COPCs being retained for surface water, instream sediments, riparian sediments, and soils in the MA and PIA. Each environmental matrix poses risk to the aquatic, riparian, and terrestrial biota based on the number of COPCs being retained for each environmental matrix and the concentrations of the COPCs. Tables 6 through 12 identify the COPCs being retained for the BERA based on HQs equal to or greater than 1.0, or the BM value was greater than the SDL, or a BM value was not available. Screening for COPCs was considered conservative given that the maximum concentration determined at each AOI defined the exposure and also, given that the BM values are based on concentrations of chemicals that are reasonably considered to be the highest acceptable concentration at or below which there should be no adverse environmental effects. Certain COPCs (Al, As, Be, Cd, Co, Cu, Pb, Mn, Ni, U, and Zn) based on their high concentrations and their distribution in the matrices are expected to be the primary drivers of risk for selected media. Other COPCs (Ba, Fe, Mg, Hg, Ag, Tl, V) are expected to impose minimal risk depending on the matrix. The BERA problem formulation (Section 3.0) will further categorize the COPCs being retained based on their level of risk.

The screening for TIR based on the exposures of the mine-related radionuclides indicated: 1) that the recommended USDOE dose criterion of 1.0 rad/day was exceeded for the protection of aquatic animals in the MA and PIA; 2) that the recommended USDOE dose criterion of 0.1 rad/day was exceeded for the protection of riparian animals in the PIA; 3) that the recommended USDOE dose criterion of 0.1 rad/day was exceeded for the protection of terrestrial animals in the MA and PIA; and 4) that the recommended USDOE dose criterion of 1.0 rad/day was exceeded for the protection of terrestrial plants only in the MA. Tables 13 to 15b summarize the TIR screening calculations. TIR exposures were significantly higher in the MA compared to the PIA. Screening for TIR was considered conservative given that the sum-of-the-fractions were determined from maximum concentrations of each radionuclide and that the background levels of TIR were not applied to the calculations. The BERA will continue the USDOE graded approach to further investigate TIR exposures in the MA and PIA.

It was concluded that all AOIs in the MA and PIA are at risk based on the COPCs being retained for each environmental matrix. Certain AOIs in the MA, particularly Pit 3, the Blood Pool and the PCP, had higher numbers of COPCs being retained and had higher concentrations of COPC relative to the AOIs in the PIA.

It was also concluded that the nine assessment endpoints selected for the SLERA are at risk in the MA and PIA. More specific assessment endpoints relevant to exposure to receptors at the Midnite Mine site are provided in the BERA Problem Formulation (Section 3.0).

3.0 PROBLEM FORMULATION FOR THE BASELINE ECOLOGICAL RISK ASSESSMENT

3.1 Overview of Problem Formulation

The problem formulation phase of the baseline ecological risk assessment (BERA) includes Steps 3 and 4 of the eight-step Superfund process (U.S. EPA 1997). Step 3 refines the screening-level problem formulation and expands on the ecological issues of concern at the Midnite Mine site. In Step 3, the results of the screening assessment (SLERA) and additional site- specific information are used to determine the scope and goals of the BERA. The components of the Step 3 process in this BERA include:

- Refining preliminary contaminants of potential concern (COPC) retained from the SLERA;
- Reviewing the total ionizing radiation (TIR) exposures defined in the SLERA;
- Further characterizing ecological effects of contaminants;
- Reviewing and refining information on contaminant fate and transport, complete exposure pathways, and ecosystems at risk;
- Selecting assessment endpoints; and
- Developing a conceptual model with working hypotheses or questions that the site investigation will address.

Step 4 is presented in Section 4 of this report; it provides the analysis plan and completes the conceptual model begun in Step 3 with the development of the measurable attributes (e.g., measures of effects and measures of exposure) for each of the assessment endpoints.

3.2 Overview of Contaminants of Potential Concern

The SLERA presented in Section 2 retained COPCs if the hazard quotient (HQ) was equal to or greater than 1.0, or no benchmark value (BM) for the environmental media was available, or the BM was less than the sample detection limit (SDL). In some cases, certain analytes were retained as COPCs as no justification exists enabling conclusions that "no substantive toxicological risk" would be derived depending on the environmental media. However, a rationale for no further risk evaluation for these specific analytes are provided. This rationale includes the unlikelihood of these analytes posing risk in specific media as a result of the anticipated mineral or chemical form of that element, and/or the general knowledge that the elements tend not to adversely impact ecosystems, or evidence does not exist that the source of the analyte is mine-related.

This overview refines the COPCs by excluding certain COPCs carried over from the SLERA based on justification presented below. The justification presented for excluding certain analytes should be viewed as "risk management decisions" by the EPA; no "technically based conclusions" are being made as to whether or not these particular analytes pose any ecological risk in the specified media.

The COPCs to be evaluated in this BERA could potentially be associated with ecological risk for which clean-up criteria may need be developed. The primary COPCs to be evaluated are identified for the aquatic, riparian/wetland, and terrestrial ecosystems in the MA and PIA.

3.2.1 Aquatic Ecosystems

Four analytes - Al, Hg, Fe, and Mg - depending on the environmental media (surface water or instream sediments) have been identified as COPCs to be excluded from further evaluation in this BERA based on the technical justifications provided below.

Aluminum

Aluminum is the third most abundant element in the earth's crust, being a major constituent of clays and other complex minerals. Aluminum is generally insoluble in natural waters in the normal pH range (6.5 to 8.0) of most surface waters. Aluminum can be mobilized from soils or sediments under low pH (less than 5.0) conditions that is often evidenced from acid mine drainage and acid deposition. It is the mobilization of Al from soils or sediments to soluble Al forms that would impose risk to aquatic organisms. When surface waters are at low pH, Al can be in free ionic and/or hydroxide forms which cause adverse effects to aquatic organisms. In addition, the organic matter content of the media (soil, sediment or water) does influence the form of Al and thereby the potential for adverse effects. Low organic matter contents have a greater potential for an adverse effect.

The exposure of Al compounds in sediments or soils from oral intake by aquatic, riparian, or terrestrial organisms to cause adverse effects is dependent on the specific form or structure of the Al compound. Insoluble Al compounds like oxides or the mineral forms associated with clay or sediment particles are considerably less toxic than soluble forms. Toxicologically, Al exerts its effects mainly through interference with phosphorous availability and/or absorption by chemically binding/reacting with the phosphorous and subsequently resulting in a phosphorous deficiency in the organism. Phosphorous becomes unavailable in the digestive tract due to the insolubility of aluminum phosphate. The ability of Al to react such that a phosphorus deficiency occurs is dependent on the chemical form of the Al, typically this requires that the Al be in a water soluble or “a free ionic” form.

The digestive tracts of many animals, particularly mammals and birds, have low pH systems. However, toxicological evidence of adverse effects from the oral toxicity of Al compounds appears primarily limited to soluble forms of Al which can immediately react with the phosphorous in the animal’s system, as opposed to insoluble forms of Al like the mineral forms associated with sediment or soil particles.

In summary, Al in surface waters may pose an environmental risk depending primarily on pH conditions. Since low pH conditions of the surface or ground waters can occur in and around the Midnite Mine site, Al is retained as a COPC for surface water. However, it is recognized that Al in sediments or soils can potentially be a source of Al as a result of the mobility from low pH water, but would not be expected to impose adverse effects via oral toxicity. Subsequently, Al in sediments is not being evaluated any further in this BERA.

Mercury

Two BM values for surface water were used for screening Hg in the SLERA one from the National Recommended Water Quality Criteria (NRWQC) and the other from the Spokane Tribe Water Quality Criteria (STWQC). When applying the NRWQC BM of 0.77 µg/L, either the HQ was less than 1.0 or the BM value was greater than the SDL. When applying the STWQC BM value of 0.012 ug/L, the BM value was less than the SDL for most of the AOIs or the HQ was greater than one for a few samples that detected Hg just above the SDL thereby retaining Hg as a COPC for the SLERA.

Analytical detection limits for Hg at or below the STWQC requires ultra-clean techniques which are not typically done unless specific information is available to indicate that a Hg source exists in a system or site. At the Midnite Mine site the mineralogy does not indicate that it would be a source for Hg. In addition, Hg was not used in any known process at the mine, eliminating Hg as a source from any mining process. The SLERA did not retain Hg as a COPC for either sediments or soils at any of the AOIs.

Mercury is known to be a toxic metal that can bioaccumulate in aquatic systems when it is biologically transformed into organo-mercury compounds. Organo-mercury compounds are highly toxic. However, the transformation of inorganic Hg to organo-mercury compounds would be unlikely given the environmental settings of the Midnite Mine site. Transformation of inorganic Hg to organo-Hg is typically a biologically mediated process and is promoted by anoxic conditions predominantly in sediments. This typically occurs in water bodies which are closed (e.g., pond and lakes) and where the bottom sediments have high organic contents to produce the anoxic conditions in the subsurface sediments. These conditions are not prevalent within the boundaries of the Midnite Mine Site. The waterbodies are generally highly aerated and flowing, and the sediments are highly mineral. Additionally, there is high groundwater conductivity with Blue Creek being a largely “gaining” stream (receiving substantial groundwater discharge to the flow). Subsequently, the conditions existing in the Blue Creek drainage would not be anticipated to promote the generation of organo-Hg; and thereby impose risk via Hg bioaccumulation.

In summary, Hg was mostly undetected in surface water samples at the SDL reported. In addition, no known sources of Hg have been identified mineralogically or from mining operations. Subsequently, Hg is not being evaluated further in this BERA.

<u>Iron</u>

Iron is the fourth most common element in the earth’s crust providing a wide variation and distribution of Fe minerals in surface water, sediments, and soils. Iron is an essential micro-nutrient to most forms of life from plants to man and is internally regulated by most organisms. The SLERA retained Fe as a COPC in surface water and sediments at most of the AOIs in the MA and PIA (Tables 6, 8, and 9). The BM values used in the SLERA were 1,000 µg/L (1.0 mg/L) for surface water based on NRWQC and 10,000 mg/kg for sediments based on a low sediment quality guideline (SQG) as described in Section 2.3.2. Many aquatic systems naturally maintain Fe concentrations in surface water above the NRWQC with no adverse effects. In addition, SQG’s can vary from the 10,000 mg/kg to greater than 200,000 mg/kg for the mid and high SQG values for Fe, respectively (Table 4).

The release of excessive amounts of Fe is common at mining sites as a result of the leaching of Fe from the mineral rocks. The environmental threats posed by the release of Fe in aquatic systems are frequently a function of the precipitation of Fe oxides resulting in the smothering and embedding of the bottom substrate of the water body. This embedding of the aquatic bed material eliminates available habitat for benthic organisms and destroys spawning areas for fish. Essentially, the adverse effect caused by the formation of Fe oxides imposes a physical impact to the aquatic system and can usually be visibly observed. However, at the Midnite Mine site neither the historic stream studies of Blue Creek or observations in the current stream survey (Appendix O) indicate any visible signs of the presence of Fe-oxide, embedding the stream bottom in Blue Creek or the Eastern Drainage.

Since Fe was analyzed in surface waters and sediments in the MA and PIA that were above the BM, it cannot be concluded that Fe does not pose risk to any of the aquatic assessment endpoints, based upon the data available to this ERA. However, given the lack of adverse toxicological threats from Fe exposure and the absence of observed Fe-related habitat impairment, Fe is not evaluated further as a COPC in the aquatic systems in either water or sediment.

Magnesium

Magnesium constitutes about two percent of the earth's crust. It is widely distributed in ores and minerals. Since it is very active chemically, it is not found in the elemental state in nature. Most Mg salts are highly soluble. Magnesium is one of the major minerals recognized as an essential nutrient for animals. Magnesium is also one of the major cations in aquatic systems and is typically a major element in sediments.

Water hardness is a function of the concentration of Mg and Ca. Hardness can influence the availability and toxicity of hardness-dependent metals (e.g., Cd, Cu, Cr, Pb, Ni, Zn). Typically, higher hardness results in lower availability and toxicity of these hardness-dependent metals.

Although Mg can cause stress to aquatic organisms based on shifts of water hardness, Mg is not considered a toxin in the same manner as other metals. Since Mg in surface waters and sediments in the MA and PIA was above the BM values, it cannot be concluded that Mg does not pose any risk to any of the aquatic assessment endpoints, based upon the data available to this ERA. However, the potential for ecological threats from Mg can not be evaluated here without additional studies; therefore, Mg will not be evaluated in this BERA.

COPCs Being Retained for Surface Water and Instream Sediments for the BERA

The primary COPCs in surface waters being retained for further evaluation in this BERA are Al, Ba, Be, Cd, Co, Cr, Cu, Pb, Mn, Ni, Se, Ag, U, and Zn.

The primary COPCs in sediments being retained for further evaluation in this BERA are Sb, As, Ba, Be, Cd, Co, Cu, Mn, Ni, Se, Ag, U, V, and Zn.

3.2.2 Terrestrial Ecosystems

Three analytes - Al, Fe, and Mg - have been identified as COPCs to be excluded from further evaluation in this BERA based on the technical justifications provided below.

Aluminum

As presented in the above Al discussion with aquatic ecosystems, Al is a major constituent of clays and other complex minerals. The EPA recognizes that due to the ubiquitous nature of Al, the natural variability of Al in soil and the availability of conservative soil screening BMs (Efroymson *et al*.1997a, Efroymson *et al*. 1997b), Al is often identified as a COPC for ERAs. The commonly used soil screening BM values are based on laboratory toxicity testing using an Al solution that is added to test soils. The U.S. EPA has deemed that comparisons of total Al concentrations in soil samples to soluble Al-based screening values are inappropriate (EPA 2000). The standard analytical measurement of Al in soils using CERCLA laboratory procedures is total recoverable metal. The following conclusions (EPA 2000) were derived from the available data on the environmental chemistry and toxicity of Al in soils to plants, soil invertebrates, mammals, and birds:

- Total Al in soil is not correlated with toxicity to tested plants and soil invertebrates.

- Aluminum toxicity is associated with soluble Al.

- Soluble Al, and not total Al, is associated with the uptake and bioaccumulation of Al from soils to plants.

- The oral toxicity of Al compounds in soil is dependent upon the chemical form. Insoluble Al compounds such as aluminum oxides or the mineral forms associated with clays or soil particles are considerably less toxic compared to soluble forms.

Ecological risk associated with Al are identified based on the measured soil pH. Aluminum can be identified as a COPC when the soil pH is less than 5.5. Soil pH values at the Midnite Mine site tend to be above 6.0 with the exception of a few samples in the MA (Tables M19 to M27).

Aluminum exerts its effects toxicologically mainly through interference with phosphorous availability and/or absorption, by chemically binding/reacting with the phosphorous, resulting in a phosphorous deficiency in the organism. The digestive tract of many animals, particularly mammals and birds, have low pH conditions with their systems. Toxicological evidence of adverse effects by Al appear to be limited to instances where Al is administered in a form which can immediately react with the phosphorous in the animals system, as opposed to insoluble forms of Al like the mineral forms associated with sediment or soil particles.

Aluminum in soils and or sediments can be a source of soluble Al as a result of the mobility from low pH water, but would not be expected to impose adverse effects. For the reasons, Al in soil will not be evaluated further in the BERA.

Iron

Iron is the fourth most common element in the earth's crust and is also a required micro-nutrient that is internally regulated by most organisms. Release of excessive amounts of Fe is a common occurrence at mining sites as Fe is leached from the base mineral rocks of mines. The environmental threat posed by Fe is typically confined to the adjacent aquatic system where Fe oxides may precipitate. While the Fe in soils may be a source to the aquatic system and thereby a risk, the risk is not from exposure to the soil Fe content. Therefore, Fe will not be evaluated further in this BERA.

Magnesium

Magnesium is an essential element, a major constituent of bone, and is highly regulated in animals. Massive doses of highly available forms of Mg can cause deleterious effects in animals, including reduced feeding and diarrhea, although in extreme circumstances lethality can occur. In birds, Mg appears to act similar to Al in that phosphorous absorption and regulation are affected.

Given that no refined forms of Mg are known to be present at the Midnite Mine Site and that Mg is an essential nutrient, the risks of Mg in soils and/or sediments are not evaluated further in this BERA.

COPCs Being Retained for Soils

The COPCs in surface soils being retained for further evaluation in this BERA are As, Cd, Cr, Co, Cu, Pb, Mn, Mo, Ni, Se, Tl, U, V, and Zn.

The primary COPCs in subsurface soils being retained for further evaluation are As, Cr, Mn, Mo, U, V, and Zn.

3.2.3 Riparian and Wetland Ecosystems

Three analytes - Al, Fe, and Mg - that were identified as COPCs in the instream sediments and soils discussed in the previous sections will also be excluded as COPCs in the riparian sediments from further evaluation in this BERA.

COPCs Being Retained for Riparian Sediments

The COPCs in riparian sediments being retained for further evaluation in this BERA are Sb, As, Be, Cd, Co, Cu, Mn, Mo, Ni, Se, U, V, and Zn.

3.3 Overview of Total Ionizing Radiation Exposures

The SLERA followed the general screening method using the sum-of-the-fractions approach (U.S. DOE 2002) for screening the risk of site-related radionuclides to aquatic, riparian, and terrestrial biota. The SLERA was based on comparing the maximum concentration of each radionuclide with the conservative limiting biota concentration guide (BCG) for each type of environmental media for each radionuclide. Total ionizing radiation for the surface water plus instream sediments exposures exceeded the recommended U.S. DOE dose criterion of 1.0 rad/day for the protection of aquatic animals at all AOIs in the MA and at several AOIs within the PIA (Table 13). For the riparian AOIs in the PIA, TIR based on the surface water plus riparian sediment exposures exceeded the recommended U.S. DOE dose criterion of 0.1 rad/day for the protection of riparian animals (Table 14). Total ionizing radiation for the surface water plus surface soil exposures exceeded 0.1 rad/day for the protection of terrestrial animals in the MA, Northeast PIA, the East and West Haul Roads (Table 15a). Only the MA exceeded the 1.0 rad/day criteria for terrestrial plants (Table 15b).

3.4 Contaminant Fate and Transport

The MA is approximately 0.5 miles wide by one mile encompassing an approximate 343-acre area (Figures 1 and 3). The ground surface of the MA was highly disturbed by mining operations. Most of the MA is unvegetated or sparsely vegetated. During mining, several pits and subpits were excavated. Overburden and waste rock were used to backfill some of the pits and altered the surface terrain, filling portions of the natural drainages in the area and creating several large piles. Metal and radionuclide contamination in the MA is extensive. Considerably higher concentrations of COPCs and radionuclides are found in the surface water, sediments, and soils in the MA than in the PIA.

The PIA adjacent to the MA was affected by mining activities via transport of site-related contaminants to the downstream drainages and downwind areas (Figures 1 and 2). Site-related contaminants migrate from surface water runoff to the drainages and to groundwater where they may be discharged to Blue Creek. The upland areas are largely undisturbed physically by the mining activities, but are potentially affected by the MA from aerial deposition. The East and West Haul Roads, unpaved roads surfaced with gravel believed to originate from the MA protore stockpile, provide access through the PIA to the MA. In addition, materials lost from haul trucks and dust or runoff from the roads may have affected areas adjacent to the roads (URS 2002).

Runoff from the MA enters seven drainages (Figures 2 and 3). The Eastern Drainage receives flow from the Northeastern Drainage and, south of the site, from the Western and Central Drainages before entering Blue Creek. All the other PIA drainages also flow into Blue Creek, except the Far Western Drainage, which flows west toward FDR Lake. Seeps emerge at several locations along the Western, Central, and Eastern Drainages. The seep water is collected and pumped back to either the Pollution Control Pond (PCP) or Pit 3 year-round. The Central Drainage has intermittent flow below its pumpback station, while the reach of the Western Drainage below its pumpback station has perennial flow. Flow from the Central and Western Drainages converge and join the Eastern Drainage that flows into Blue Creek (Figures 1 and 2). Flow in these drainages from late Fall to Spring is dominated by precipitation, snow melt and groundwater discharge. Base flow is predominantly groundwater discharge. The onsite waste treatment facility (WTF) operates from Spring into late Fall. The WTF receives water from Pit 3 and Pit 4 and removes metals in a batch process involving the application of barium chloride and lime. The treated water from the WTF is discharged to the Eastern Drainage. This WTF, which began operations in 1992 and is regulated under a federal discharge permit, can contribute greater than 95% of the flow to the Eastern Drainage from Spring to Fall when it is discharging. However, when the WTF is not operating, the flow in the Eastern Drainage (apart from collected seep water) flows to Blue Creek. The water is largely groundwater discharge, which may be impacted by the MA.

A literature search was conducted to obtain information on the fate and transport of each COPC. This information is presented in Appendix I.

3.5 Ecological Effects

Literature searches were conducted to obtain information on the ecological effects for all of the COPCs to mammals and birds. Literature was reviewed to provide a general overview of the toxicity and toxic mechanism for a given COPC for various exposure routes. Toxicological profiles for mammals and birds are provided in Appendix J. Table 16 presents the No Observable Adverse Effect Level (NOAEL) and Lowest Observable Adverse Effect Level (LOAEL) of each COPC.

Literature searches were also conducted to obtain ecological effects information for amphibians. Appendix K provides the studies evaluating adverse effects of metals to amphibians. A paucity of literature on toxicological effects to amphibians limited the presentation of a more comprehensive assessment for this ERA. Most of the toxicological profiles are derived from studies in water with a few studies in sediment and from dietary exposure. Table 17a presents the NOAEL and LOAEL for those COPC for which data was available.

3.6 Site Ecosystems

Section 2.2.1 provides overviews of the three ecosystems at risk- aquatic, riparian and wetland, and terrestrial - at the Midnite Mine Site. A more detailed characterization of the ecological habitats and biota of the site have been presented in the Technical Memorandum, *Ecological Characterization of Midnite Mine* (URS 2000).

3.6.1 Exposure Pathways

Potential complete exposure pathways include direct contact with contaminated media, ingestion of contaminated food items or surface water, incidental ingestion of soil or sediment, dermal contact, and inhalation. Dermal contact and inhalation pathways of exposure are difficult to evaluate because they are difficult to quantify and little information is available in the literature on contaminant effects on wildlife species through these pathways. However, these exposure pathways are believed to be small (when compared to the significance of the ingestion pathways).

Table 1 summarizes the exposure pathways to soil organisms, aquatic and amphibian receptors, and terrestrial and riparian wildlife.

3.6.1.1 Exposure Pathways, Aquatic Systems

The aquatic habitat in the MA consists of Pits 3 and 4, Blood Pool, and the PCP. In addition to the high concentrations of metals and radionuclides in the surface water and sediments of these lacustrine habitats, they are also characterized by low pH and high dissolved solid concentrations that would further impose risk to many aquatic organisms.

Surface water runoff, snowmelt, and groundwater flow from the MA to the PIA drainages and to Blue Creek. Contaminants are present in surface water and groundwater and have accumulated in the sediment. Components of the stream ecosystem exposed to site-related contaminants include the periphyton, benthic macroinvertebrates, and fish.

Benthic and infaunal organisms inhabit the sediment and directly absorb contaminants through dermal contact with sediment particles and interstitial water, as well as through ingestion of contaminated food items and incidental ingestion of sediment. For benthic and infaunal organisms, the interstitial water phase may represent a substantial portion of the respired fluids; however, for other organisms, such as fish, respiration of interstitial water is considered a minor exposure route.

The water column represents the primary source of exposure for fish. Fish absorb contaminants through dermal exposure and through respiration. A number of chemical factors affect the rate of absorption through the dermal layer, gills, or the cell membranes including concentration, molecular size, water and lipid solubility, extent of ionization, hydrolysis of the chemical at the pH of the epidermis and dermis, and duration of exposure. Additionally, transfer of chemicals across a dermal membrane is a function of the amount of exposed dermis in contact with the contaminated media. Fish may also be exposed to contaminants through the ingestion of contaminated food items and incidental ingestion of sediment.

The periphyton community is comprised of algae, bacteria, fungi, and meiofauna held in a polysaccharide matrix attached to submerged strata in a stream. Direct contact with surface water is the primary exposure route. Periphyton absorb contaminants from surface water through direct contact.

Due to the dynamic nature of the sediment, interstitial water, and surface water, this ERA did not attempt to quantify the exposure of macroinvertebrates, fish, and periphyton through each exposure route described above. Measures of exposure were instead evaluated based on contaminant concentrations detected in the surface water and sediments.

3.6.1.2 Exposure Pathways, Terrestrial Systems

The terrestrial habitat in the MA is primarily unvegetated with the exception of small areas of coniferous forest and some revegetation projects. The lacustrine habitats in the MA present attractive nuisances to various wildlife (e.g., deer and elk) for watering and consuming salt deposits. In addition, the MA offers habitat that attracts certain types of organisms to reside including the cliff swallow and the marmot.

The Upland PIA is largely undisturbed by mining activities and is dominated by an overstory of either Ponderosa pine or a mixture of Ponderosa pine and Douglas fir. An overview of the plant and animal communities that could be utilizing the Midnite Mine site has been previously described (See Section 2.2.1.3).

The soil community is exposed to contaminants through direct contact with the soil and soil interstitial water. Additional exposure may result from the ingestion of contaminated food items. The soil community may also be indirectly affected by a change in ecosystem functions, such as nutrient cycling and energy transfer, that are important to growth and reproduction.

The vascular plant community is exposed to contaminants through direct contact with the soil and soil pore water. Vegetation may also be indirectly affected by a change in ecosystem functions, such as nutrient cycling and energy transfer, that are important to growth and reproduction. The presence of contaminated soil not only places plants at risk, but also affects the organisms that utilize vegetation for food and habitat.

Mammals, such as voles, raccoons, mink, deer, marmots, and coyotes, may utilize the MA and PIA for food. Such mammals may feed on vegetation, fish, invertebrates, and other terrestrial small mammals. Therefore, mammals may be exposed to contaminants through ingestion of contaminated food items. They may also be exposed to contaminants through ingestion of contaminated water; incidental ingestion of contaminated sediment or soil; direct contact with contaminated water, sediment, or soil; and inhalation.

Birds residing and/or utilizing either the MA or PIA inhabit the brush land or forested sites of the system. Some birds, like the bald eagle, are piscivorous; others are insectivorous and feed on soil macroinvertebrates or other insects. Carnivorous birds feed on small mammals or soil invertebrates that may have accumulated contaminants in their tissues, while omnivorous birds may feed on a variety of contaminated items. Therefore, these birds may be at risk through ingestion of contaminated food items, water, and soil or sediment, as well as through inhalation of contaminants or direct contact with contaminated soil or sediment.

Amphibians may be exposed to contaminants through direct contact with soil/sediment particles, ingestion of contaminated food items or incidental ingestion of soil/sediment, and direct contact with surface water.

3.6.1.3 Exposure Pathways, Riparian/Wetland Systems

The banks and low lying areas bordering the Eastern, Central, and Western Drainages and Blue Creek are considered riparian and/or wetland habitats in the PIA. These riparian and wetland systems are considered biologically productive systems and important wildlife habitats providing food, cover, and travel routes for a diversity of wildlife.

The wetland plant community is exposed to contaminants through direct contact with the soil and soil pore water. Vegetation may also be indirectly affected by a reduction in ecosystem functions, such as nutrient cycling and energy transfer, that are important to growth and reproduction. The presence of contaminated soil not only places plants at risk but affects the organisms that utilize vegetation for food and habitat.

Aquatic and semi-aquatic organisms inhabit the wetlands and directly absorb contaminants through dermal contact with soil and interstitial water, through ingestion of contaminated food items, and through direct contact with surface water. For benthic and infaunal organisms, the interstitial water phase may represent a substantial portion of the exposure.

3.7 Assessment Endpoints

Assessment endpoints are explicit expressions of the actual resources that are to be protected. Valuable ecological resources include those without which ecosystem function would be significantly impaired or those providing critical resources (e.g., habitat). Appropriate selection and definition of assessment endpoints are critical to the utility of an ERA as they focus risk assessment design and analysis. It is not practical or possible to directly evaluate risks to all of the individual components of the ecosystem on-site, so assessment endpoints are used to focus the risk assessment on particular components of the ecosystem that could be adversely affected by the contaminants associated with the site. In general, the assessment endpoints selected for the site are aimed at the viability of aquatic and terrestrial trophic levels and organism survivability.

By protecting each of these assessment endpoints, the aquatic and terrestrial ecosystems should be protected based on the concepts of trophic dynamics/energy transfer, and population and community dynamics. Trophic dynamics is based on the assumption that plants and animals can be placed into feeding groups or trophic levels, where the energy from one level can be passed onto the level above it, thereby keeping the system in a state of equilibrium (Smith 1990). An example of a simple trophic level transfer would be a plant (primary producer), which is eaten by an herbivore, which is eaten by a carnivore. Trophic/energy transfer is an important consideration when assessing ecosystem health, as deleterious effects to any one level may affect the overall energy budget of the system. In a system impacted by contaminants, trophic transfer takes on another level of importance as energy transfer may now include the potential transfer of contaminants up the food chain through bioaccumulation/biomagnification.

The concepts of population and community dynamics are also integral to the concept of trophic dynamics. A population may be defined as a group of individuals of the same species in an ecosystem. Populations occupy specific niches in the community and therefore within the energy budget of the ecosystem. As such, population level effects, that is, factors affecting mortality, reproduction, immigration, etc., are critical to energy transfer and community dynamics. A community may be defined as a group of populations living together in an environment that interact through competition, predation, mutualism, etc. Community interactions influence community attributes such as species abundance and diversity, which are critical parameters in the assessment of ecosystem structure and energy transfer. Protection of an ecosystem must take into consideration trophic, population, and community dynamics.

While the assessment endpoints being selected for these ERAs focus primarily on the specific effects to the trophic levels of the terrestrial, riparian, wetland, and aquatic communities, it is with an understanding that these trophic levels and communities do not exist in a “black box”, but rather interact with and affect the trophic dynamics of other communities and populations. For example, some of the assessment endpoints chosen for this ERA examine trophic levels and communities that function as both predators and prey. Predation, while critical to energy transfer in the system, also plays an important role in regulating and maintaining population size, species abundance, and diversity. For example, piscivorous/aquatic feeding birds prey on fish and benthic organisms, thereby potentially affecting the density and diversity of these populations and communities. Conversely, the piscivorous/aquatic feeding birds may also serve as prey items to upper level carnivores and contribute to regulating the density and diversity of upper trophic levels. The concept of energy transfer is critical, and will be discussed individually for each endpoint. The overall assessment endpoint for this ERA is viability of the aquatic, riparian, and terrestrial ecosystems associated with the Midnite Mine Site. As such, each of the specific assessment endpoints listed are sub-categories of this overall endpoint.

Assessment endpoints for characterizing the risk of metals in the MA and PIA are grouped into three categories encompassing aquatic ecosystems, terrestrial ecosystems, and riparian/wetland ecosystems. A fourth group of assessment endpoints focus on the risk related to the TIR exposure.

3.7.1 Aquatic Ecosystems

Flowing water ecosystems are important for maintaining unique assemblages of organisms; for processing energy, organic matter, and nutrients; for receiving materials from the land and air and transforming them and transporting them to downstream areas and ultimately to the oceans; and for providing sustenance, protection, and corridors for movement of organisms. A large portion of the following discussion was derived from Minshall (1998; Appendix A). Stream ecosystems are comprised of an interacting set of abiotic and biotic factors operating within a variety of spatial and temporal dimensions. Abiotic factors can be physical (e.g., flow, substrate, suspended matter, temperature, and channel morphology) or chemical. Biotic factors are either structural or functional. Structural attributes include diversity, trophic composition, abundance and biomass, while functional attributes are related to processes such as energy flow and materials cycling. Structural and functional ecosystem components operate semi-independently and an understanding of both components is necessary to describe an ecosystems state or condition. The biotic community in a given area interacts with the physical and chemical environment to produce a flow of energy, which leads to discernable structural and functional organization and cycling of materials.

The health of the stream has a direct impact on the health of the entire ecosystem; impacts to the stream relate directly to degradation of the whole ecosystem. Maintenance of stream structure and function is important, since it provides habitat for many species of plants and animals. Streams also process and transport energy, organic matter, and nutrients. Biota utilizing the stream corridor often rely extensively on the resources (e.g., forage) provided by the stream to support survival, growth, and reproduction.

3.7.1.1 Assessment Endpoint #1: Viability and Function of the Periphyton Community

The periphyton community is comprised of algae, bacteria, fungi, and meiofauna held in a polysaccharide matrix attached to submerged strata in a stream. Benthic algae are generally the dominant group of organisms in the periphyton community. Stream periphyton communities can be affected by nutrient or sediment loading, light, temperature, water velocity and grazing pressure.

Benthic algae play a role in the stream ecosystem; they are at the base of the stream food web. Photosynthesis by algae fixes carbon and provides food for herbivores, as well as providing oxygen for aerobic organisms in the stream. Even in streams where algal biomass is low, the food quality of algae is often much higher than that of detritus, representing a more nutritious food resource for stream inhabitants.

An important role of benthic bacteria is the assimilation of dissolved materials from the overlying water. This results in the transfer of organic carbon associated with dissolved organic matter (DOM) from the overlying stream water to surfaces where it can be metabolized by benthic microbes; this represents an important source of organic matter and energy to the periphyton community.

The periphyton community was determined to be of concern due to its role in energy flow, its potential for exposure to contaminants, and its role as a food source for higher trophic level organisms. Therefore, periphyton community viability and function is a valid assessment endpoint for this ERA.

3.7.1.2 Assessment Endpoint #2: Viability and Function of the Benthic Macroinvertebrate Community

The benthic macroinvertebrate community of small streams is typically diverse taxonomically, morphologically, and physiologically, and often consist of numerically abundant populations. Additionally, the benthic macroinvertebrate community plays a key role in ecosystem functions such as nutrient cycling and organic matter processing, and is a food resource for the pelagic community, including fish, as well as semiaquatic organisms such as birds and mammals.

As mentioned above, most of the energy available to stream ecosystems is fixed in the riparian area or upstream reaches. Energy is introduced in three forms including coarse particulate organic matter (CPOM; leaves and other debris), fine particulate organic matter (FPOM; drift and small particles), and DOM. Because most headwater streams receive their energy supply from the riparian area, the majority of first level consumers are detritus-feeders. Leaves and debris that enter the stream lodge against banks, debris, and stones and lose organic matter as water leaches soluble material from the tissue. The leachate becomes part of the DOM. The surface of the leaf is rapidly colonized by bacteria and fungi and is attacked by shredders such as craneflies, caddisflies, and stoneflies that feed on CPOM. Although these organisms break down the organic matter, they derive most of their energy and nutrients from the bacteria and fungi. Of the material they ingest, shredders pass a substantial amount as feces which become part of the FPOM. Broken up by the shredders and partially decomposed by the microbes, the leaf becomes part of the FPOM which also includes some precipitated DOM. The FPOM is accumulated by collectors (fine particle detritivores), which include black flies and netspinning caddisflies.

Although not dominant, primary consumers also feed on the periphyton community and include the beetle larvae and mobile caddisfly larvae. Much of the material they scrape loose enters the drift as FPOM. Predaceous organisms feeding on the detrital feeders and scrapers include insect larvae such as the dobsonfly.

The benthic macroinvertebrate community was determined to be of concern due to its role in energy flow and materials cycling, its potential for exposure to contaminants, and its role as a food source for higher trophic level organisms. Therefore, viability and function of the benthic macroinvertebrate community is a valid assessment endpoint for this ERA.

3.7.1.3 Assessment Endpoint #3: Viability and Function of the Fish Community

The fish community in a stream plays a key role in ecosystem functions such as energy flow, nutrient cycling and organic matter accumulation, and is a food resource for higher trophic level species. Fish present in flowing water ecosystems are adapted for particular habitats through morphological, physiological, or behavioral adaptations. Strong active swimmers such as trout, suckers, some minnows, and darters inhabit riffle and other areas of rapid flow. These species seek refuge from the current behind boulders or are strongly associated with the substrate; they feed by actively encountering drifting macroinvertebrates. The coarse substrate of the riffle areas are spawning areas for these fish species, which bury their eggs in gravel. Pools, overhanging stream banks and other habitats characterized by quiet or less rapid flow support a different fish community that may include sunfish and minnows. These areas also function as post hatching nursery and feeding areas for stream fish. Similar to macroinvertebrates, fish food webs include detritivores, carnivores, herbivores, and omnivores. Predacious species (e.g., trout, sculpin) may feed heavily on terrestrial invertebrates that fall into the stream.

The fish community was determined to be of concern due to its role in energy flow, its potential for exposure to contaminants, and its role as a food source for higher trophic level organisms. Therefore, viability and function of the fish community is a valid assessment endpoint for this ERA.

Representative species of the fish community at the Midnite Mine site have been previously listed (URS 2000) including the brown trout, rainbow trout, Margined sculpin, and several species of suckers.

3.7.2 Terrestrial Ecosystems

This section describes the components of the terrestrial ecosystem potentially affected. There are a number of biotic communities and habitats that are potentially affected. In a number of instances, adverse effects may be the result of the toxic nature of contaminants. However, adverse ecological effects may also be a result of habitat modifications including the attractive nuisance of certain habitats such as the water sources and the salt deposits in the mine area. Assessment endpoints 4 through 16 have been identified for this risk assessment.

3.7.2.1 Assessment Endpoint #4: Viability and Function of the Terrestrial Soil Community

The soil community of a terrestrial ecosystem plays a key role in ecosystem functions such as nutrient cycling and organic matter processing. Soil invertebrates can be an important food resource for upper trophic level species such as insectivorous small mammals and birds. The terrestrial soil community is typically diverse taxonomically, morphologically and physiologically; soil biota are often numerically abundant. The soil community is comprised of the more visible soil invertebrates such as earthworms and grubs; it also includes less visible groups such as bacteria, fungi, and small invertebrates such as nematodes and protozoa. Although the soil community is typically considered a separate ecosystem, it is intimately connected to the aboveground terrestrial community through a common energy source (living and dead vegetation and animal biomass and feces). Because of their abundance, feeding habits, and ecological functions, inhabitants of the soil community have an important influence on the terrestrial environment.

The most outstanding characteristic of the soil is that while complex, it is a habitat that is relatively stable chemically and structurally. Until the moisture drops below a specific point, the soil atmosphere remains at or near saturation, and the soil temperature remains within a relatively narrow range. The low penetrability of soil restricts movement to most taxa except to burrowing species such as earthworms. Soil pore space is an important factor that determines the nature of the living space, humidity, and gaseous condition of the environment. The importance of pore space is evident in areas where the adverse effects of highly compacted soil are present. Spaces between surface litter, cavities walled off by soil aggregates, pore spaces between individual soil particles, root channels, and fissures are potential habitats.

The presence of a variety of habitats results in the high taxonomic diversity of the soil community.

The interrelations of soil organisms are complex, and within the upper layers of the soil energy flows through a series of trophic levels. The soil community is largely heterotrophic (requiring an external supply of organic matter). The primary source of energy is dead vegetation, dead animal biomass, and feces from the ground layer. This organic matter is consumed and broken down by bacteria, fungi, and protozoans. Litter feeders, including most earthworms, pot worms, millipedes, snails, slugs, and small soil arthropods, ingest large quantities of organic matter and primarily utilize only the bacteria, fungi, protozoans, and small invertebrates contained in the material. Phytophagous consumers, including nematodes and root-feeding insects, obtain nutrients from assimilable substances of living plants. Predators, which exploit the soil microinvertebrates, include protozoa and free-living nematodes. Other predators, including the turbellaria, feed on nematodes and pot worms.

Because of its role in ecosystem functions such as energy transfer and nutrient cycling and its importance as a food source for upper trophic level terrestrial species, an ecologically viable soil invertebrate community was selected as a valid assessment endpoint for this ERA.

3.7.2.2 Assessment Endpoint #5: Viability and Function of the Terrestrial Plant Community

The terrestrial rooted vascular plant community assumes many functions in the ecosystem. Functions include: erosion prevention (both water and wind), promotion of rainwater percolation, restriction of sheet water flow leading to reduced flooding potential, reduction of surface wind velocity, providing nesting and cover habitat for wildlife, primary production via photosynthesis, and providing a source of organic matter input (energy) to streams and soil systems.

Rooted plants provide erosion control through a variety of mechanisms. Plant roots hold the soil in place, and the surface structure of the plants slows water movement, thereby reducing the ability of water to move the soil. In addition, slow flowing water permits increased percolation into the soil, and reduces the volume of water moving across the soil surface. This also slows the overall movement of the water into surface waterbodies, which dampens the fluctuations in surface water levels. Ultimately, this reduces the potential for flooding and decreases the severity of flooding that does occur. Finally, the physical structure of the plants also reduces the ground surface air speed, thereby reducing wind-based erosion.

The terrestrial plant community provides nesting habitat and cover (resting/hiding places) for wildlife. Trees, shrubs and tall grass provide nesting materials and habitat for most species of birds, as well as many mammal species such as squirrels, rabbits, and mice. In general, the diversity of animal life is associated with the stratification and growth forms of plants present in a system.

Plants also provide the basis for food production in the terrestrial ecosystem. Energy enters the terrestrial system in the form of light, which is fixed into chemical energy by photosynthesis. A significant portion of the energy fixed is used for plant metabolism. The amount of energy fixed by photosynthesis minus the amount used for plant respiration is the net primary productivity (NPP) of a system; this is the amount of energy stored in plant tissues. Part of the NPP is the food source for herbivores and decomposers; the remainder accumulates in the plant community as biomass. The distribution and rate of turnover of biomass is related to the types of herbivores present and the relative importance of decomposers in the system. Nuts, seeds, and leaves produced by plants are consumed directly by herbivores such as deer, rabbits, and insects. Herbivores, in turn, are then consumed by higher trophic levels.

In addition to the primary production utilized in the terrestrial ecosystem, trees and shrubs along stream banks drop leaves into the stream in the fall of the year. This material is a primary source of energy in lower order (small) streams and is the basis for the production of stream insects and other organisms which provide food for fish and birds. By the same means, plants provide energy input to the soil community (as organic matter), which drives nutrient cycling and other aspects of soil functioning.

Plants also serve an important role in nutrient and mineral cycling in the terrestrial ecosystem. There are two major aspects of materials cycling: the uptake and release of nutrients by biota and the exchange of materials between biota and other parts of the ecosystem. Nutrients are lost from a system through run-off, both in surface and groundwater, which carries away materials leached out of the litter and soil. Inputs to the system occur through precipitation, airborne deposition of dust, and weathering of parent bedrock. Plants take up nutrients and minerals from soil and build up an available or exchangeable pool of nutrients. In temperate forests, nutrients and minerals accumulate in tree biomass to form a pool unavailable to short-term cycling. For example, in an Appalachian oak-hickory forest, 65% of each pool of nitrogen, phosphorus, and potassium is incorporated in woody tissue, 22% is in roots, and 13% is in foliage (Smith 1990). Nutrients are recycled from the vegetative pool by root mortality, litter fall, and foliage leaching.

Terrestrial plant community function and viability was determined to be a valid assessment endpoint for this ERA.

3.7.3 Assessment Endpoints #6 through #16: Viability and Function of the Terrestrial Vertebrate Community

The vertebrate community of a terrestrial ecosystem plays a key role in ecosystem functions such as energy flow and organic matter production. The vertebrate community is comprised of a variety of species that perform various roles. Terrestrial vertebrates are typically the most visible and familiar organisms in an ecosystem.

Energy flow through an ecosystem is critical to the function of that ecosystem. The flow of energy drives material cycles; recycling nutrients and water requires an expenditure of energy, which is not recyclable. Energy flows through a terrestrial ecosystem along a food web. A food web is comprised of producers, primary consumers (herbivores), secondary consumers (animal eaters), and so on. Each step in the web is a trophic level, which is an energy level rather than a species level. Any given species may utilize more than one level (e.g., omnivores consume both animals and plants). Plant production can be eaten by consumers as living material or as dead material (detritus); consumption of the former is designated as the grazing food chain, whereas consumption of the latter is the detritus food chain. Terrestrial vertebrates generally make up the grazing and predator food chains. An estimated 10,000 energy units of sunlight or 100 energy units of herbivores are required for every one energy unit of predator (Odum 1997). Although predators are an energy-expensive component of an ecosystem, they are very important in terms of feedback controls of herbivores, which in turn can have a major impact on plant production.

Impacts on organisms at any trophic level could result in detrimental population explosions in their prey species. Such population explosions result in an imbalance in the energy and nutrient allocations among the other organisms inhabiting the same ecosystem, resulting in the decline of affected populations. In addition, organisms which serve as a food source for higher trophic level organisms function to maintain the population balance of these higher trophic levels. Adverse impacts on an herbivorous species (e.g., meadow voles) could affect the number of predator species a particular ecosystem can support. Conversely, predators often selectively feed on older or sick organisms thereby resulting in a robust prey population. Adverse effects on a predator species can thus affect the health of a prey species in a system. Because of the importance of each trophic level in an ecosystem, the assessment endpoints selected for this risk assessment follow feeding/energy transfer pathways in the terrestrial systems at the Midnite Mine site.

In general, taxonomic diversity of the terrestrial vertebrate community is associated with the stratification and growth forms of the vegetative community. Some organisms are associated with or spend the major part of their life in a single stratum, whereas others may range over two or more stratums. In particular, the soil invertebrates remain in the subterranean and the litter layers. The greatest diversity and abundance is present on and just below the ground layer. Vertebrates, including mice, shrews, squirrels, and foxes, burrow into the soil for shelter or food, but spend considerable time above ground. The larger mammals live on the ground layer and feed on herbs, shrubs, and low trees. Birds are present and move freely among several strata, but generally occupy one strata most of the time. For example, ruffed grouse and hooded warblers occupy the ground layer, but may move up into the trees to feed, roost, or advertise territory. Some invertebrates, such as millipedes and spiders, move into the upper strata at night when humidity is favorable. Red-eyed vireos inhabit the lower tree stratum of the eastern deciduous forest, the wood peewee the lower canopy, and blackburnian warblers and scarlet tanagers the upper canopy. Flying squirrels and tree mice inhabit the canopy, and woodpeckers, nuthatches, and creepers are closely associated with the tree trunks between the shrub and the canopy layers.

The association of species with specific strata within its habitat results in foraging areas that comprise only a portion of the home range of a particular species. Many organisms forage in areas where preferred foods are available, or where previous hunts have been successful. These behaviors may result in increased exposure to contaminants, if foraging behavior is concentrated in contaminated areas.

In addition to the physical habitat structure provided by the plant community, the terrestrial plant community affects the species composition of the grazing food chain and associated predators. Although only a relatively small part of the plant biomass is typically harvested, the composition of the terrestrial herbivore community (and subsequently the omnivore and predator communities) is a function of the type of vegetation present and the timing of appearance and growth of particular vegetative parts such as shoots, seeds, and fruit.

3.7.3.1 Assessment Endpoint #6: Viability and Function of the Herbivorous Mammal Community

Herbivorous mammals rely primarily on vegetation as forage. The role of herbivores is essential to an ecosystem because they transfer the energy available in plant tissue (primary producers) to animal tissue, making it available to upper trophic level organisms. In addition to contributing to energy pathways in a terrestrial system, herbivore foraging on vegetation regulates vegetation density, species abundance, and diversity. Herbivorous small mammals serve as prey items for upper trophic level predators. Therefore, herbivorous small mammals contribute to a balanced vegetative community, in terms of species diversity and abundance, while regulating upper trophic level terrestrial organisms. This balance is essential for normal ecosystem functioning. Because of their size, small mammals generally have small home ranges (Harestad and Bunnell 1979). The low mobility of small mammals suggests a high potential for exposure and enables specific exposure routes and concentrations to be identified with a high degree of certainty.

The herbivorous small mammal component of the terrestrial ecosystem is of concern due to the potential for the accumulation of contaminants and transfer to higher trophic level consumers, as well as for the high potential for direct exposure and adverse effects. Additionally, small mammals are a large component of the terrestrial food chain base, representing an important food resource for carnivorous organisms such as birds and mammals. Viability of the herbivorous small mammal community was therefore considered an appropriate assessment endpoint for this ERA.

Representative species of the herbivorous mammal community expected to inhabit or utilize the Midnite Mine site include meadow vole, white-tailed deer, mule deer, marmot, muskrat, and elk (URS 2000). The meadow vole, white-tailed deer, and the muskrat were the receptors selected for modeling risk to the herbivorous mammal community.

3.7.3.2 Assessment Endpoint #7: Viability and Function of the Carnivorous Mammal Community

Carnivorous mammals rely primarily on terrestrial vertebrates for forage. The role of carnivores is essential to an ecosystem because they transfer the energy available in animal tissue to upper trophic levels. In addition to contributing to energy pathways in a terrestrial system, carnivore foraging on small mammals regulates small mammal density, species abundance, and diversity. Conversely, carnivorous mammals may also serve as prey items for upper trophic level predators. Predation by and of carnivorous mammals therefore contributes to a balanced small mammal community, in terms of species diversity and abundance, while regulating other upper trophic level terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since some carnivorous mammals are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to a process known as biomagnification. In a terrestrial system, carnivorous mammals are common predators of small mammals. Small mammals have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, mammals that consume small mammals have the potential to accumulate large concentrations of contaminants in their tissues.

Carnivorous mammals regulate the population size of rodents and other small mammals with high reproductive capabilities. They are also important in energy transfer in the system. Based on the ecological role of carnivorous mammals and the potential for exposure and adverse effects in a higher trophic level organism, the viability and function of the carnivorous mammal community was determined to be a valid assessment endpoint for this ERA.

Representative species of the carnivorous mammal community expected to inhabit or utilize the Midnite Mine site include bobcat, red fox, coyote, wolverine, and gray wolf (URS 2000). The coyote and the bobcat were the receptors selected for modeling risk to the carnivorous mammal community.

3.7.3.3 Assessment Endpoint #8: Viability and Function of the Omnivorous Mammal Community

Omnivorous mammals consume plant and animal tissue from several trophic levels. In addition to linking energy pathways in a terrestrial system, omnivores foraging on insects, small mammals, and vegetation regulate the population density of these groups. Conversely, omnivorous mammals may also serve as prey items for upper trophic level predators. Predation by and of omnivorous mammals therefore contributes to a balanced small mammal and vegetative community, as well as regulating other mid- to upper trophic level terrestrial organisms. This balance is essential for normal ecosystem functioning.

Based on the role of omnivorous mammals in energy transfer and population regulation, as well as the potential for exposure and adverse effects, the viability of the community was selected as a valid assessment endpoint for this ERA.

Representative species of the omnivorous mammal community expected to inhabit or utilize the Midnite Mine site include the raccoon, deer mice, grizzly bear, striped skunk, water vole, and yellowpine chipmunk (URS 2000). The raccoon and the deer mouse were selected for modeling risk to the omnivorous mammal community.

3.7.3.4 Assessment Endpoint #9: Viability and Function of the Piscivorous Mammal Community

Piscivorous mammals rely primarily on fish as forage. There is a close relationship between terrestrial and aquatic systems due to the flow of nutrients and energy between them. Nutrients enter aquatic ecosystems through surface water runoff, streams, and water infiltration through the soil. Energy enters aquatic ecosystems via sunlight and biological inputs such as detritus and leaves. Nutrients and energy are transferred from aquatic to terrestrial ecosystems via biological outputs. An example of a biological output is the act of a piscivorous mammal consuming fish. Nutrient and energy cycles between aquatic and terrestrial systems are delicately balanced. Since nutrients and energy are limiting factors in the production of an ecosystem, the transfer of energy from an aquatic to a terrestrial system is essential. Piscivorous mammals provide one mechanism by which the nutrients and energy are transferred and are therefore important in the maintenance of balanced nutrient and energy cycles.

In addition to contributing to aquatic and terrestrial energy pathways, the predation of fish regulates fish population size, species abundance, and diversity. Conversely, piscivorous mammals may also serve as prey items for upper trophic level predators. Predation by and of piscivorous mammals therefore contributes to balanced populations of fish and other aquatic and terrestrial organisms; a balance that is essential for normal ecosystem functioning.

Since some piscivorous mammals are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to biomagnification. Fish have been shown to accumulate contaminants that are present in aquatic ecosystems. Therefore, mammals that consume fish have the potential to accumulate large concentrations of contaminants in their tissues.

Piscivorous mammals play an important role in energy transfer and population regulation. Based on its ecological role and the potential for exposure and adverse effects in a higher trophic level organism, the viability of the piscivorous mammal community was determined to be a valid assessment endpoint for this ERA..

Representative species of the piscivorous mammal community expected to inhabit or utilize the Midnite Mine Site include the mink and river otter. The mink was the receptor selected for modeling risk to the piscivorous mammal community.

3.7.3.5 Assessment Endpoint #10: Viability and Function of the Soil Invertebrate Feeding Mammal Community

The soil invertebrate feeding (referred to here as insectivorous) small mammal community plays a key role in ecosystem functions such as energy flow. Insectivorous small mammals rely primarily on insects as forage. The foraging behavior of insectivorous mammals represents a pathway by which nutrients and energy are transferred from lower to higher links in the food chain. For example, insects are consumed by mid-level insectivores (e.g., shrews) which are consumed by upper level consumers (e.g., red-tailed hawk). Insectivores also transfer energy from the detrital food chain to the grazing food chain when they consume detritivores (e.g., millipedes).

In addition to contributing to terrestrial energy flow pathways, the predation of insects regulates insect population size and species abundance and diversity. Iinsectivorous mammals also serve as prey items for upper trophic level predators. Predation by and of insectivorous mammals therefore contributes to balanced populations of insects and other terrestrial organisms, a balance that is essential for normal ecosystem functioning.

Since insectivorous mammals are mid-level predators, they are exposed to contaminants which can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to bioaccumulation or biomagnification. In a terrestrial system, small mammals such as shrews are common predators of insects. Insects have been shown to accumulate contaminants in terrestrial ecosystems. Therefore, mammals that consume insects have the potential to accumulate large concentrations of contaminants in their tissues.

The insectivorous small mammal community was determined to be of concern due to its role in energy flow, its potential for exposure to contaminants, and its role as a food source for higher trophic level organisms. Viability and function of the insectivorous small mammal community is a valid assessment endpoint for this ERA. The masked shrew was the receptor selected for modeling risk to the soil invertebrate feeding mammal community at the Midnite Mine site.

3.7.3.6 Assessment Endpoint #11: Viability and Function of the Insectivorous Avian Community

Insectivorous birds rely primarily on insects as forage. The foraging behavior of insectivorous birds represents a pathway by which nutrients and energy are transferred from lower to higher links in the food chain For example, insects are consumed by mid-level insectivores which are in turn consumed by an upper level consumer. Insectivores may also transfer energy from the detrital food chain to the predator food chain in that insectivores may consume detritivores (e.g., millipedes), thereby providing a link between the two chains. Insectivorous birds also consume emerging aquatic insects, and, like piscivorous mammals, they are important in energy and nutrient transfer between aquatic and terrestrial systems.

In addition to contributing to terrestrial and aquatic energy pathways, the predation of insects regulates insect population size, species abundance, and diversity. Conversely, insectivorous birds also serve as prey items for upper trophic level predators. Predation by and of insectivorous birds therefore contributes to balanced populations of insects and other terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since some insectivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to bioaccumulation. Insects have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume insects have the potential to accumulate large concentrations of contaminants in their tissues.

Some birds are resident year-round and some are migratory. The mobility of potential avian receptors, as well as their relatively large home range, variable diet, and often seasonal residency, suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty.

Nonetheless, the avian insectivorous community is of concern due to its role in energy transfer and regulating populations, and the potential for exposure and adverse effects in a higher trophic level organism. Therefore, viability of the insectivorous avian community was determined to be a valid assessment endpoint for this ERA.

More than 60 species representing the insectivorous avian community expected to inhabit or utilize the Midnite Mine Site have been previously listed (URS 2000). The cliff swallow was the receptor selected for modeling risk to the insectivorous avian community.

3.7.3.7 Assessment Endpoint #12: Viability and Function of the Omnivorous Avian Community

Omnivorous birds consume plant and animal tissue from several trophic levels. In addition to linking energy pathways in a terrestrial system, omnivores foraging on insects, small mammals, and vegetation regulate the population density of these groups. The foraging behavior of omnivorous birds may represent a pathway by which nutrients and energy are transferred from lower to higher links in the food chain. For example, invertebrates are consumed by mid-level omnivores, which are in turn consumed by an upper level consumer. Omnivores may also transfer energy from the detrital food chain to the grazing food chain in that omnivores may consume detritivores (e.g., millipedes), thereby providing a link between the two chains.

In addition to contributing to terrestrial energy pathways, the predation of invertebrates and vegetation regulates invertebrate and vegetation population size and species abundance and diversity. Conversely, omnivorous birds also serve as prey items for upper trophic level predators. Predation by and of omnivorous birds therefore contributes to balanced populations of insects and other terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since some omnivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants that bioaccumulate in the organisms upon which they feed. Invertebrates, small mammals, and vegetation have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume these items have the potential to accumulate large concentrations of contaminants in their tissues.

Some birds are resident year-round and some are migratory. The mobility of potential avian receptors, as well as the relatively large home range, variable diet, and often seasonal residency, suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Nonetheless, the avian omnivorous community is of particular concern due to its role in energy transfer and population regulation, and the potential for exposure and adverse effects in a mid-to higher trophic level organism. Therefore, viability of the omnivorous avian community was determined to be a valid assessment endpoint for this ERA.

Representative species of the omnivorous avian community expected to inhabit or utilize the Midnite Mine Site have been previously listed (URS 2000) including the mallard, blue jay, chickadee, and so forth. The mallard was the receptor selected for modeling risk to the omnivorous avian community.

3.7.3.8 Assessment Endpoint #13: Viability and Function of the Soil Invertebrate Feeding Avian Community

Soil invertebrate feeding birds are mid-trophic level organisms that rely primarily on soil invertebrates as forage. The foraging behavior of soil-invertebrate feeding birds represents a pathway by which nutrients and energy are transferred from lower to higher links in the food chain For example, soil invertebrates are consumed by mid-level birds which are in turn consumed by an upper level consumer. Birds such as the American robin and Wilson's snipe transfer energy from the detrital food chain to the predator food chain when they consume detritivores (e.g., millipedes).

In addition to contributing to terrestrial pathways, the predation of soil invertebrates regulates invertebrate population size, species abundance, and diversity. Conversely, soil-invertebrate feeding birds also serve as prey items for upper trophic level predators. Predation by and of soil-invertebrate feeding birds therefore contributes to balanced populations of soil invertebrates and other terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since some soil invertebrate feeding birds are mid-trophic level predators, they are susceptible to exposure to contaminants which bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to bioaccumulation or biomagnification. Soil invertebrates have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume soil invertebrates have the potential to accumulate large concentrations of contaminants in their tissues. Additionally, soil invertebrates such as earthworms may contain large amounts of soil entrained in their gut, resulting in incidental exposure of soil invertebrate feeding birds to contaminated soils.

Some birds are resident year-round and some are migratory. The variable mobility of potential avian receptors, relatively large home range, variable diet, and often seasonal residency, suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Nonetheless, the soil invertebrate feeding avian community is of concern due to their role in energy transfer and regulating populations, and the potential for exposure and adverse effects in a higher trophic level organism. Therefore, viability of the soil invertebrate feeding avian community was determined to be a valid assessment endpoint for this ERA.

Representative species of the soil invertebrate feeding avian community expected to inhabit or utilize the Midnite Mine Site have been previously listed (URS 2000). The American robin and Wilson's snipe were the receptors selected for modeling risk to the soil invertebrate feeding avian community.

3.7.3.9 Assessment Endpoint #14: Viability and Function of the Carnivorous Avian Community

Carnivorous birds are upper trophic level organisms that rely primarily on animal tissue, such as small mammals, as forage. The foraging behavior of carnivorous birds represents a pathway by which nutrients and energy are transferred from lower to higher links in the food chain. In addition to contributing to energy pathways in a terrestrial system, carnivore foraging on small mammals regulates small mammal density, species abundance, and diversity. Conversely, carnivorous birds may also serve as prey items for other upper trophic level predators (e.g., screech owls). Predation by and of carnivorous birds therefore contributes to a balanced small mammal community, in terms of species diversity and abundance, while regulating other upper trophic level terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since carnivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to bioaccumulation. Small mammals have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume small mammals have the potential to accumulate large concentrations of contaminants in their tissues.

Some birds are resident year-round and some are migratory. The mobility of potential avian receptors, as well as the relatively large home range, varied diet, and often seasonal residency suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Nonetheless, the carnivorous avian community is of concern based on its ecological role (energy transfer and controlling the population size of rodents and other small mammals with high reproductive capabilities) and the potential for exposure and adverse effects in a higher trophic level organism. Therefore, the viability of the carnivorous avian community was determined to be a valid assessment endpoint for this ERA.

Representative species of the carnivorous avian community expected to inhabit or utilize the Midnite Mine site have been previously listed (URS 2000) including the great horned owl, American kestrel, barred owl, redtail hawk, Peregrine falcon, Cooper's hawk, and so forth. The great horned owl and the American kestrel were the receptors selected for modeling risk to the carnivorous avian community.

3.7.3.10 Assessment Endpoint #15: Viability and Function of the Piscivorous Avian Community

Piscivorous birds rely primarily on fish as forage, and this behavior represents a pathway by which nutrients and energy are transferred from the aquatic to the terrestrial ecosystem. There is a close relationship between terrestrial and aquatic systems due to the flow of energy and nutrients between them. Nutrients enter aquatic ecosystems through surface water runoff, streams, and water infiltration through the soil. Energy enters aquatic ecosystems via sunlight and other biological inputs such as detritus and leaves. Nutrients and energy are transferred from aquatic to terrestrial ecosystems via biological outputs. An example of a biological output is the act of a piscivorous bird consuming fish and/or benthic invertebrates. Nutrient and energy cycles between aquatic and terrestrial systems are delicately balanced. Since nutrients and energy are limiting factors in the production of an ecosystem, the transfer of energy from an aquatic to a terrestrial system is essential. Piscivorous birds are therefore important in the maintenance of balanced nutrient and energy cycles.

In addition to contributing to aquatic and terrestrial energy pathways, the predation of fish regulates fish population size. Conversely, piscivorous birds also serve as prey items for upper trophic level predators. Predation by and of piscivorous birds therefore contributes to balanced populations of fish and other aquatic and terrestrial organisms, a balance which is essential for normal ecosystem functioning.

Since piscivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. Fish have been shown to accumulate contaminants that are present in aquatic ecosystems. Therefore, birds that consume fish have the potential to accumulate large concentrations of contaminants in their tissues.

Some birds are resident year-round and some are migratory. The mobility of potential avian receptors, as well as the relatively large home range, variable diet, and often seasonal residency suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Nonetheless, the avian piscivorous community is of concern. Piscivorous birds play an important role in energy transfer and regulating populations. Based on its ecological role and the potential for exposure and adverse effects in a higher trophic level organism, the viability of the piscivorous avian community was determined to be a valid assessment endpoint for this ERA. The great blue heron and the bald eagle were the receptors selected for modeling risk to the piscivorous avian community.

3.7.3.11 Assessment Endpoint #16: Viability and Function of the Herbivorous Avian Community

Herbivorous birds are lower trophic level organisms that rely primarily on vegetation as forage. They are an important food resource for higher trophic level species. They play an essential role in an ecosystem, as they transfer the energy available in plant tissue (primary producers) to animal tissue, and make it available to upper trophic level organisms.

In addition to contributing to terrestrial energy flow pathways, foraging by herbivores on vegetation regulates vegetation density, and species abundance and diversity. Conversely, herbivorous birds also serve as prey for upper trophic level predators. Predation by and of herbivorous birds therefore contributes to a balanced vegetative community, in terms of species diversity and abundance, while regulating upper trophic level terrestrial organisms. This balance is essential for normal ecosystem functioning.

Herbivorous birds are susceptible to exposure to contaminants which can accumulate in and on plant tissues upon which they feed. Plants have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume plants have the potential to accumulate these contaminants in their tissues.

Some birds are resident year-round and some are migratory. The variable mobility of potential avian receptors, relatively large home range, variable diet, and often seasonal residency, suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Many bird species will exhibit focused foraging and directed feeding in the presence of seasonally available prey (e.g., based on growing and fruiting seasons) resulting in an increased exposure to contaminated food. Nonetheless, the herbivorous avian community is of concern due to their role in energy transfer and regulating populations, and the potential for exposure and adverse effects in a mid-to higher trophic level organism. Therefore, it was determined that viability and function of the herbivorous avian community was a valid assessment endpoint for this ERA.

Representative species of the herbivorous avian community expected to inhabit or utilize the Midnite Mine Site have been previously listed (URS 2000) including the Spruce grouse, Pine grosbeak, and Yellow- bellied sapsucker. The Spruce grouse and the song sparrow are the receptors selected for modeling risk to the herbivorous avian community.

3.7.4 Assessment Endpoint #17: Viability and Function of the Amphibian Community

The diversity, density, and reproductive success of amphibians have been shown to be sensitive to chemical environmental stressors. Amphibians rely on vernal ponds associated with the terrestrial habitat at the Midnite Mine site. However, previous smelting activities have fragmented the habitat and may have reduced the availability of breeding habitat for site-associated amphibian communities. A decrease in amphibian populations at the Midnite Mine site may indicate either exposure to contaminants or a lack of suitable habitats.

Amphibians are important to energy transfer in the terrestrial systems because they provide a link between the aquatic and terrestrial systems and act as both predators and prey. Predation by and of amphibians therefore contributes to balanced populations of other aquatic and terrestrial organisms; a balance that is essential for normal ecosystem functioning. Based on the ecological role of amphibians in energy transfer and regulating populations, as well as the potential for exposure and adverse effects in a sensitive group of organisms, the viability of the amphibian community was determined to be a valid assessment endpoint for this ERA.

3.7.5 Assessment Endpoints #18 and 19: Viability and Function of Wetland Ecosystems

Wetland ecosystems play a key role in functions such as energy fixation, nutrient and materials cycling, water purification, organic matter production, fish and wildlife habitat, flood control, stabilization of flow, and erosion control. There is a direct linkage between the wetland plant community and the nature and stability of soils. Based on the role of wetlands in ecosystem function and the potential for exposure to contaminants, the viability and function of wetland systems were selected as assessment endpoints for this ERA.

Wetlands are of ecological importance for numerous reasons. They provide diverse fish and wildlife habitat, allow groundwater recharge and discharge, improve water quality through nutrient cycling/removal/transformation and sediment/toxicant retention, help control flooding and stabilize flows, and prevent erosion and secure shorelines.

Numerous animal taxa rely on wetlands for reproduction; wetlands serve as nurseries for development of early life stages, foraging areas, and protection from predation and environmental extremes. Freshwater fish depend on wetlands for nursery and spawning areas, and use them as refuges during flood events. Wetlands are important habitats for reproduction and subsequent development of embryo and larval life stages of many toads, frogs, and salamanders. Many species of birds use wetlands as breeding and foraging habitat. Insect diversity in wetlands may be extremely high, and many species of aquatic insects are found only in wetland habitats. Reptiles, such as water snakes and bog turtles, reproduce, live, and forage in wetland habitats as adults. Mammals such as muskrat and beaver are typical wetland species.

Wetland functions and organism viability were determined to be valid assessment endpoints for this ERA.

3.7.5.1 Assessment Endpoint #18: Viability and Function of the Wetland Plant Community

Wetland plants are central to the structure and function of the wetland. They are a primary food source for many wetland animal species, including developing fish and amphibian larvae. These plants provide habitat and cover for wetland animals, help control the hydrology of the wetland, promote nutrient cycling and stabilization, and help hold the wetland soils during floods.

As discussed above, wetlands are very productive ecosystems; wetland plants are capable of capturing a large amount of solar energy and storing it as chemical energy. High plant productivity is the basis for the high overall production of ducks, muskrats, and other wildlife in marshes.

Vegetation provides habitat and cover for organisms which utilize wetland areas. Environmental factors such as hydrology and oxygen availability affect the distribution of wetland vegetation, which in turn affects the number and kinds of habitat available to animals. Wetland vegetation creates habitat that is vertically stratified in and above the water column. Algae and invertebrates utilize pelagic (water column), epiphytic (stems), and benthic habitats (Vymazal 1995, Sharitz and Batzer 1999). Vertical stratification of emergent vegetation is an important determinant of songbird habitat (Weller and Spatcher 1965); plants provide nest sites, nesting materials and songposts. Wetland plants provide isolation between nesting pairs of waterfowl, often determining breeding density and production. In addition, wetland plants provide food for waterfowl and herbivorous mammals.

Wetland plants provide a key function in maintaining the quality and volume of surface and groundwater. Wetlands intercept sediments and nutrients, and often a variety of organic and inorganic chemicals and heavy metals. By removing such materials, wetlands filter and clean surface water that may eventually percolate into the underlying aquifer, becoming groundwater. Removal of sediment and nutrients from surface water can prevent siltation and eutrophication in nearby rivers, streams, lakes, and ponds.

Rooted wetland plants provide erosion control through a variety of mechanisms including the roots physically holding the soil in place; the surface structure of the plants physically slows water movement, thereby reducing the water energy and its ability to move the soil. In addition the slowing of the water permits increased percolation of the water into the soil. The physical slowing of the sheet water flow and increased percolation of the surface water into the soil slow the overall movement of the water into the surface waterbodies; the effect of this is to dampen the fluctuations in surface water levels. Ultimately, this reduces the potential for flooding and decreases the severity of flooding that does occur. Wetland plant community function and viability was therefore determined to be a valid assessment endpoint for this ERA.

3.7.5.2 Assessment Endpoint #19: Viability and Function of the Wetland Invertebrate Community

The invertebrate community of a wetland ecosystem plays a key role in ecosystem functions such as nutrient cycling and organic matter processing. It also serves as an important food resource for fish and semiaquatic organisms such as birds and mammals.

Many wetland invertebrate species are detritus feeders. They recycle biomass produced in the wetland as well as organic matter transported into the wetland. The role of invertebrates in materials cycling contributes to the productivity of wetland systems. In addition, invertebrates serve as an important food source for fish and other higher trophic level organisms.

3.7.6 Assessment Endpoints # 20 Through 22: Characterizing Risk of Total Ionizing Radiation Exposures to Animal and Plant Populations

The U.S. DOE guidance for evaluating radiation doses to aquatic and terrestrial biota is intended "to protect populations of aquatic animals, terrestrial animals, and terrestrial plants from the effects of exposure to anthropogenic ionizing radiation"(U.S. DOE 2002). Certain taxa are more sensitive to TIR than others. Subsequently, it is generally assumed that protecting the more sensitive taxa will adequately protect other less sensitive taxa. Specified biota dose limits are defined in the U.S. DOE guidance that protect the populations of plants and animals from the effects of TIR as follows:

Aquatic animals: The absorbed dose should not exceed 1.0 rad/day.
Terrestrial plants: The absorbed dose should not exceed 1.0 rad/day.
Terrestrial and Riparian animals: The absorbed dose should not exceed 0.1 rad/day.

Assessment Endpoint # 20: Observable Reductions of Survival and Reproductive Capability in Aquatic Animal Populations Related to Total Ionizing Radiation Exposure.

Assessment Endpoint # 21: Observable Reductions of Survival and Reproductive Capability in Riparian Animal Populations Related to Total Ionizing Radiation Exposure.

Assessment Endpoint #22: Observable Reductions of Survival and Productivity and/or Reproductive Capability in Terrestrial Plant and Animal Populations Related to Total Ionizing Radiation Exposure.

3.8 Site Conceptual Models

Conceptual models are based on contaminant and habitat characteristics and are used to identify critical exposure pathways linking contaminants to receptors. Contaminants in the water, soil, and sediment may come in contact with the aquatic, riparian, or terrestrial receptors inhabiting or utilizing the Midnite Mine site. Both the complete exposure pathways (Section 3.6.1) and the assessment endpoints (Section 3.7) were used to develop the conceptual models in this ERA. Figure 4 is a conceptual model depicting potential exposure pathways from contaminants in surface water and sediments in the open pits in the MA. Figure 5 is a conceptual model depicting potential exposure pathways from contaminants in surface water, instream sediments, and riparian sediments in the PIA. Figure 6 is a conceptual model depicting potential exposure pathways from surface material in the MA and Figure 7 is a conceptual model depicting potential exposure pathways from soils and riparian sediments in the PIA.

3.9 Testable Hypotheses

Testable hypotheses are specific risk questions that are based on the assessment endpoints and the conceptual models. Table 17b presents the testable hypotheses for this ERA.

4.0 ANALYSIS PLAN

Step 4 of the eight-step Superfund process defines the analysis plan and is the final stage of the problem formulation. Step 4 completes the conceptual model begun in Step 3 with the development of the measurable attributes for each of the assessment endpoints. Risk hypotheses are evaluated to determine how they will be assessed. The plan includes a delineation of the assessment design, data needs, measures, and methods for conducting the analysis phase and the risk characterization phase with the emphasis on evaluating risk from chemical stressors regulated under CERCLA.

4.1 Measurable Attributes

Measurable attributes define the measures that will be employed to quantify and predict change of the assessment endpoints from potential exposure to chemical stressors. There are three categories of measures - measures of exposure, measures of effect, and measures of ecosystem characteristics. Measures of exposure are measures of stressor existence and movement in the environment and their contact or co-occurrence with the assessment endpoint. Measures of effect are measurable changes in an attribute of an assessment endpoint in response to a stressor. Measures of ecosystem characteristics are measures that influence the behavior and location of entities selected as the assessment endpoint, the distribution of a stressor, and life-history characteristics of the assessment endpoint or its surrogate that may affect exposure or response to the stressor (U.S. EPA 1998a). Measures of effects are the critical measurable attributes for this BERA. The measurable attributes selected for each of the assessment endpoints are presented in Table 17c.

4.2 Database Overview

Investigations for the Midnite Mine site were conducted by Ecology & Environment during 1998 (E&E 1998), by SMI. in 1999 (SMI 1999a), and by URS from 1999 to 2001 (URS 2000a, 2001a, 2001b). The site investigations encompassed the sampling of surface water, instream sediments, riparian sediments, soils, and aquatic, riparian and terrestrial invertebrates and plants.

4.2.1 Environmental Media Sampling for Metals and Radionuclides

Sections 2.3.1.1 through 2.3.1.4 described the sampling for surface water, instream sediments, riparian sediments, and soils at the Midnite Mine site for metals and radionuclides. All of the data was compiled into an electronic database. Summary tables for metals for each AOI and matrix are presented in Appendices D through G. Each summary table includes the number of samples analyzed for each COPC, the number of samples for which the analyte was detected above the sample detection limit (SDL), the minimum concentration detected, the maximum concentration detected, and the central tendency (median or mean value). Appendix B presents the statistical methods for calculating central tendency. Appendix H presents the summary tables for TIR calculations.

4.2.2 General Parameters Related to Ecosystem Characterization

The site investigations included the determinations of general parameters (e.g., pH, hardness, sulfate, phosphorus, etc.) characterizing surface water, sediments and soils. Appendix M provides the summary tables for the soils, sediments, and surface water at each of the AOIs. The analytical results are presented in Section 5.

4.2.3 Tissue Analysis of Plants and Invertebrates

Biological sampling of aquatic plants and invertebrates, riparian plants and invertebrates, and terrestrial plants and invertebrates was performed in September and October 1998 for the purpose of detecting the bioaccumulation of site-related metals (SMI 1999). These site-specific tissue analyses were used in the food chain models for this ERA (See Section 4.3.2).

4.2.3.1 Vegetation Sampling

Terrestrial roots and aboveground plant tissue were collected from four upland sites designated as US1, US2, US3, and US4 delineated in Figure 8 (SMI 1999b). Roots and aboveground tissue plus litter were collected from six plots for each upland site. For aboveground tissue, all aboveground herbaceous material was clipped to ground level and collected in three randomly located 0.5 square meter (m^2) quadrats at each plot. A representative sample of leaves and twigs of woody species (litter) was also harvested from each plot. No further information was available regarding the composition of the litter. Aboveground tissue was separated by species and weighed, then all aboveground tissue plus litter from each plot was composited to form a single aboveground plant sample for metal analysis. For roots, five root cores (0 to 20 centimeters [cm] in depth) were taken from each plot. The plot locations of the cores within each plot were randomly determined. Root samples were weighed and speciated. All root tissue was composited to form a single root sample from each plot (SMI 1999b).

Riparian plant tissue was collected from six riparian/aquatic locations including three sites from Upper Blue Creek (BU1, BU2, and BU 3), three sites from Middle Blue Creek (BD1, BD2, and BD 3), two sites from Central Drainage (CD1 and CD2), two sites from Eastern Drainage (ED1 and ED2), and two sites from Western Drainage (WD1 and WD2). Figure 8 delineates the site locations. Each riparian site was divided into six plots and riparian root and aboveground tissue samples were obtained from each plot. Samples were collected in the same manner as above (SMI 1999b).

Aquatic plants were collected from three sites in the Eastern Drainage (ED1, ED2, and ED1/ED2), from three sites in Western Drainage (WD1, WD2, and WD1/WD2), five sites along Upper Blue Creek above the confluence of Blue Creek and the Eastern Drainage (BU1, BU2, BU3, BU2/BU1, BU2/BU3), and five sites along Middle Blue Creek downstream of the confluence of Blue Creek and the Eastern Drainage (BD1, BD2, BD3, BD1/BD2, BD2/BD3). Figure 8 delineates the site locations. At each location, aquatic plants were collected from the same plots where aquatic sediments were collected. A 0.5 m^2 quadrat was centered in each plot, and all rooted or otherwise attached plant material within the quadrat was harvested. The aquatic plant materials from the quadrats in the six plots were composited into a single aquatic plant sample for metal analysis. Sampled aquatic plants were not identified (SMI 1999b).

All plant material was washed to remove soil or sediments prior to compositing. All samples were dried and then weighed to give biomass values in dry weight. Analytical results for terrestrial plants, riparian plants, and aquatic plants are presented in Section 5 and Appendix N.

4.2.3.2 Invertebrate Sampling

Invertebrates were collected from the same locations as upland soil and terrestrial plants, riparian plants, and aquatic plants were collected. Sample designations are the same as indicated for the plant sampling on Figure 8 (SMI 1999c). A five-minute net sweep covering the entire plot area was used for the upland plots. The net method involves sweeping an insect net through a standard area of vegetation for the time period needed to collect a representative sample of invertebrates present. Over 1,000 invertebrates from 12 orders were collected from upland locations, and composited into eight samples. A three-minute net sweep covering the entire plot was used for riparian plots. Over 2,000 invertebrates from 12 different orders were collected from the riparian locations. One sample each was composited from the Eastern and Western Drainages, two samples each from the Central Drainage and Middle Blue Creek locations, and three samples from the Upper Blue Creek locations (SMI 1999b).

Three replicate samples of aquatic invertebrates were collected in each aquatic plot, near where aquatic sediment samples were taken. Over 3,000 invertebrates from eight different orders were collected and composited into samples from two locations in the Eastern Drainage, one location in the Western Drainage, and three locations in Blue Creek (SMI 1999b).

All samples were dried and then weighed to give biomass values in dry weight. Analytical results for terrestrial invertebrates, riparian invertebrates, and aquatic invertebrates are presented in Section 5 and Appendix N.

4.2.3.3 Conversion of Isotopic Uranium Measurements to Total Uranium

Shepherd Miller, Inc. pooled samples when sufficient biomass was not available to include the analysis of all the metals plus U for the plant and invertebrate analyses. In addition, elemental U analysis was substituted for U isotopic analysis when biomass was insufficient. Isotopic analysis of U was measured by analyzing for ^{234}U,

^{235}U, and ^{238}U in the biological samples. Total U was estimated from the U isotopes with the following equation:

Total U (mg/kg) = (U_{234} {pCi/g} x 1.63E-04 {mg-g/pCi-kg}) + (U_{235} {pCi/g} x 4.65E-01 {mg-g/pCi-kg}) + (U_{238} {pCi/g} x 3.00E+00 {mg-g/pCi-kg})

In the calculations, it was assumed that U by mass is present as 0.00560% ^{234}U with a specific activity of 6,220 µCi/g, 0.708% ^{235}U with a specific activity of 2.14 µCi/g, and 99.3% ^{238}U with a specific activity of 0.336 µCi/g. The specific activity of the radioisotopes are values used by EPA for drinking water compliance to convert U activity to mass. Uranium isotopes in the biological samples could be present at different percentages than those found in natural U.

4.3 Risk Assessment Methods

4.3.1 Hazard Quotient Method

The Hazard Quotient (HQ) method (Barnthouse *et al.* 1986; U.S. EPA 1997) was employed in this ERA. Briefly, the HQ method compares exposure concentrations to toxicity reference value (TRV) or benchmark (BM) values based on ecological endpoints such as mortality, reproductive failure, or reduced growth. This is done using chronic toxicity values derived from the literature that are intended to represent a lower dose over a longer duration of exposure, resulting in subtle effects that would be expected to manifest themselves at the population level over the long term. Both the No Observable Adverse Effect Level (NOAEL) and the Lowest Observable Effect Level (LOAEL) values were used to determine HQs. The higher HQ values (above 1.0) imply increased effects to the assessment endpoint.

The comparison is expressed as a ratio of potential intake values to effect levels, as follows:

$$HQ = \frac{\text{Exposure Concentration (Maximum or Central Tendency)}}{\text{Chronic Effect Level (e.g., NOAEL or LOAEL)}}$$

4.3.2 Food Chain Models

Food chain models were employed for assessing the measures of effects for Assessment Endpoints 6 through 16. Figures 9 to 14 present schematic diagrams of the food chain models used in this BERA. Four exposure scenarios or models were evaluated for each receptor species. Models 1 and 2 (Figures 9 and 10) estimated exposure based on soil/sediment and water exposure, but excluded food ingestion. Models 3 and 4 (Figures 11 to 14) included soil/sediment and water exposure plus food intake exposure to estimate total exposure. A comparison between Models 1 and 2 with Models 3 and 4 provide a means of distinguishing if a particular environmental matrix (soil/sediment, water, or food) may be driving risk. The results of these models were used to determine the contamination values that bound the threshold for adverse effects to each assessment endpoint (U.S. EPA 1997). A summary of the four exposure models is as follows:

Model 1 (Figure 9) used conservative life history parameters and maximum concentrations of contaminants in water, soil, and sediment. Conservative life history parameters included the lowest published adult body weight and the highest published ingestion rates for incidental sediment/soil. Food intake was excluded for this model.

Model 2 (Figure 10) used representative life history parameters and central tendency (mean or median) concentrations of contaminants in water, soil, and sediment. Representative life history parameters included the mean (or mid-point of a published range) adult body weight and the mean (or mid-point of a published range) ingestion rates for water, and incidental sediment/soil. Food intake was excluded for this model.

Model 3 (Figures 11 and 12) used the same conservative life history parameters as Model 1 along with the highest published ingestion rates for food. Food exposure was based on either the maximum site-specific tissue data or conservative literature-based bioaccumulation factors (BAF).

Model 4 (Figures 13 and 14) used the same representative life history parameters as Model 2 along with the average (or mid-point of a published range) ingestion rates for food. Food exposure was based on either the maximum site-specific tissue data or conservative literature-based BAF values.

Nineteen receptor species were selected to model Assessment Endpoints 6 through 16 (See Sections 3.7.3) via food chain exposure models. The mammalian and avian species that reside and/or utilize the Midnite Mine site and were selected as receptors to represent several of these assessment endpoints include:

<u>Mammalian Species:</u>	<u>Avian Species</u>
Meadow vole	Cliff swallow
White-tailed deer	Mallard duck
Muskrat	American robin
Coyote	Wilson’s snipe
Bobcat	American kestrel
Masked shrew	Great horned owl
Deer mouse	Great blue heron
Racoon	Bald eagle
Mink	Song sparrow
	Spruce grouse

These species should be viewed as surrogates for the assessment endpoints and not as the assessment endpoints themselves, although select species may have a special status. Conceptually, these species represent appropriate exposure pathways and mechanisms of toxicity for their respective assessment endpoints. Life history profiles developed from published literature for each receptor provided both the conservative and representative parameters (soil/sediment ingestion rates, food ingestion rate, water ingestion rate, and body weight) that were entered into the models as described in Section 4.3.3.

This BERA utilized simplified assumptions in the food chain models, since it is difficult to mimic a complete diet. The seasonal availability of prey also results in a temporary prey specialization by the consumer. Given these factors and the conservative approach used in the food chain models, carnivorous, piscivorous, insectivorous, and soil invertebrate feeding receptor species were assumed to only consume a single food item. Omnivorous receptor species were based on two food items. With the exception of the meadow vole, all other herbivorous species were assumed to consume above-ground plant tissue. For the meadow vole modeling was based on consuming root tissue and aboveground tissue, respectively. The selection of specific diets permits the modeling to focus on exposure pathways allowing sensitivity analysis in interpreting what is driving risk.

Soil and sediment ingestion rates were entered into the models as dry weight with the exception of the following receptors - muskrat, mink, cliff swallow, Wilson's snipe, great blue heron, and the bald eagle. For these receptors the soil or sediment ingestion rates were entered into the models as wet weight as described in each life history profile for that receptor in Appendix L. However, it should be noted that inputting wet weight soil/sediment ingestion rates into the exposure models results in more conservative (i.e., higher) estimates of risk. Water concentrations were entered into the models as unfiltered water or total metal concentrations thus representing a more realistic exposure via ingestion of water than the use of filtered or dissolved concentrations.

The exposure from food ingestion was based on either site-specific tissue data that was available or utilized literature-based BAFs. Site-specific tissue data, as discussed in Section 4.2.3, was available for aquatic plants and invertebrates, terrestrial plants (aboveground and root tissue), terrestrial invertebrates, riparian plants (aboveground and root tissue), and riparian invertebrates. For the site-specific tissue data only the maximum concentration of the COPC analyzed as dry weight for each type of food at each location was used in the food chain models to provide the most conservative estimation. For those food items for which site-specific data was not available including earthworms, fish, and small mammals, BAF values derived from the literature were used in the food chain models (See Section 4.3.5).

The effect level values for each COPC referred to as TRVs were based on studies in the published literature (See Section 4.3.4). Two TRVs are used to evaluate ecological risk, a NOAEL and a LOAEL. The NOAEL is the highest dose at which adverse effects are not expected to occur in a study, and the LOAEL is the lowest dose at which adverse effects are expected to occur. The exposure concentrations derived from the modeling were entered into the HQ equation, and a HQ was calculated for both the NOAEL and LOAEL. The following assumptions were made:

- A contaminant concentration was considered to exceed the threshold and demonstrate model calculated risk to the given receptor if both the NOAEL-based HQ and LOAEL-based HQ were greater than or equal to 1.0.

- If neither the NOAEL- or LOAEL-based HQs were greater than or equal to 1.0, it was concluded that there is no model calculated risk to the given receptor.

- If the NOAEL-based HQ was greater than or equal to 1.0 but the LOAEL-based HQ was not, it was concluded that it could not be determined that there was no model calculated risk.

4.3.3 Life History Parameters

Life history and exposure profiles for the receptor species selected for the assessment endpoints are presented in Appendix L. Life history parameters are summarized in Tables 18 and 19. For each receptor, a conservative and representative exposure profile has been developed. Conservative exposure parameters include the lowest reported adult body weight, highest ingestion rates, and smallest home range cited for a species. Representative exposure parameters include the average adult body weight, ingestion rates, and home range size located for a particular species, regardless of the geographic range in which a study was conducted. Home range, feeding territory and breeding territory size have been reported in the literature for several species. However, for this ERA, an area use factor (AUF) of 1.0 was utilized, as the conservative assumption was made that the receptors spend all of their time, and acquires all of their food at the site.

4.3.4 Ecological Effects Characterization

A comprehensive literature search was conducted to locate studies in which the toxicity of COPCs to wildlife receptors was evaluated. Each study was reviewed to evaluate its appropriateness for inclusion in the derivation of a TRV. A discussion of these studies, and the criteria used to evaluate them is presented along with the toxicity profiles in Appendix J. The TRVs used in the food chain exposure models for this BERA are listed in Table 16.

4.3.5 Bioaccumulation Factors

In an ERA context, the best data to estimate bioaccumulation of contaminants in environmental media (sediments, soils, water) by organisms (plants, invertebrates, small mammals, earthworms, fish) will usually be the utilization of site-specific data. In the absence of site-specific data, BAFs or regression models are used. For the food chain models, BAFs for small mammals, earthworms and fish were derived from literature-based data. The small mammal BAFs were entered into the models for coyote, bobcat, great horned owl, and American kestrel. The earthworm BAFs were entered into models for the masked shrew and the American robin. The fish BAFs were entered into models for the mink, great blue heron, and bald eagle.

Bioaccumulation factors for small mammals and earthworms were based on the reports prepared for the U.S. DOE. The bioaccumulation models for small mammals appears in the "Development and Validation of Bioaccumulation Models for Small Mammals" (Sample *et al*.1998a). The bioaccumulation models for earthworms appears in the "Development and Validation Models for Earthworms" (Sample *et al*.1998b). Both reports assembled databases of soil and contaminant concentrations in small mammals and earthworms from published literature for a wide range of contaminants for the purpose developing uptake factors and other bioaccumulation models from these data (Sample *et al*.1998a, Sample *et al*.1998b).

The final BAF values for small mammals and earthworms were reported in terms of mean, minimum, maximum, and 90th percentile values (Table 20A) (Sample *et al*.1998a, Sample *et al*.1998b). Although the 90th percentile BAF values may provide a more accurate depiction of bioavailability, the specific literature for which the maximum values were derived was not reviewed for this BERA. It should be noted that some of these maximum BAF values are expected to be overly conservative. For example, the maximum BAF for Pb for earthworms was reported to be 228.2 and the 90th percentile was 1.5. It would be expected that a fairly unique circumstances are most likely responsible for deriving such a high maximum BAF value for that metal. However, for this BERA, maximum BAF values were selected to err on the conservative side for the food chain modeling.

For small mammals a database of chemical concentrations in soil and whole bodies of small mammals for As, Ba, Cd, Co, Cr, Cu, Fe, Hg, Ni, Pb, Se, Tl, and Zn was used for developing uptake factors derived from Sample *et al.* (1998a). The whole body concentrations of the small mammals was based on dry weight concentrations. For this BERA the conservative BAFs at maximum value for small mammals based on combining all datasets were used (Table 20A) (Sample *et al*.1998a).

For U, uptake factors in small mammals have been reported from several references ranging from 0 .0002 to 0.00032 (Garten *et al.* 1987, Sample *et al.* 1997). However, these BAFs for U are based on a limited dataset of only a few studies; with this high degree of uncertainty, a BAF of 1.0 for U for small mammals is being applied for this ERA. Uptake factors were also not available for Mo for small mammals. Subsequently a BAF of 1.0 for Mo for small mammals is being applied for this BERA.

For earthworms a database of chemical concentrations in soil and earthworms for As, Cd, Cr, Cu, Hg, Mn, Ni, Pb, and Zn was used for developing uptake factors. Only depurated (ingested soil material removed) earthworms were used for developing the BAFs and metal concentrations of the earthworms were based on dry weight. For this ERA the conservative BAFs at maximum value for earthworms were used (Table 20A) (Sample *et al*.1998b). Final BAFs for U were not derived in Sample *et al.* (1998b) because of the limited database. However, a BAF was reported in the validation dataset of this report based on two studies giving a maximum BAF of 0.063. The same rationale as was previously discussed for small mammals, in regards to the uncertainty related to using a limited dataset, was also applied for earthworms. For this BERA a BAF of 1.0 for U for earthworms is being applied. Uptake factors were also not available for Tl for earthworms. Subsequently a BAF of 1.0 for Tl for earthworms is being applied for this BERA.

A literature search was conducted to identify water to fish BAFs for metals. The database was insufficient to derive whole-body BAFs for many of the inorganic COPCs. Several studies were located that reported BAFs for U, Cd, and Ni for freshwater fish (Table 20B).

Reported BAFs for U ranged from 2 to 50 (Mahon 1982; NRCC 1982; Poston 1982; Swanson 1983; Poston and Klopfer 1985; CSA 1987; Myers 1989; Driver 1994; ATSDR 1999). A conservative BAF of 50 was selected to estimate U concentrations in fish for the food chain models (Poston and Klopfer 1986; Myers 1989).

Reported BAFs for Cd ranged from 3.6 to 73 (Harrison and Klaverkamp 1989; Ricard *et al.* 1998; Hansen *et al.* 2002). A conservative BAF of 73 was selected to estimate Cd concentrations in fish for the food chain models. Reported BAFs for Ni ranged from 18.2 to 61 (MEQB 1979; U.S. EPA 1980; Sreedevi *et al.* 1992). The conservative BAF of 61 was selected to estimate Ni concentrations in fish for the food chain models.

4.3.6 Risk Assessment Method for Aquatic Communities

Measures of effects to aquatic communities including periphyton, benthic invertebrates, and fish (Assessment Endpoints 1,2, and 3) were based on the results that were derived from the SLERA. The SLERA estimated risk to aquatic communities utilizing the HQ method by comparing the measured concentrations of metals in surface water and/ or sediments to the surface water and sediment BM values as described in Section 2.3.2.1.

Risk was calculated for the aquatic communities exposed to surface water and/or sediments at four AOIs at the MA (Pit 3, Pit 4, Blood Pool, and Pollution Control Pond [PCP]) and at seven AOIs in the PIA (Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Upper Blue Creek, Middle Blue Creek, and Lower Blue Creek, and FDR Lake). If the concentration of a COPC measured in surface water and/or sediment exceeded the surface water BM and/or the sediment BM (Table 2), periphyton, benthic macroinvertebrates, and fish were considered at risk from exposure to that metal at that location.

In addition, a field survey was performed to evaluate the community structure of the benthic community in Blue Creek and the Eastern Drainage (See Section 4.4).

4.3.7 Risk Assessment Method for Soil Microorganisms and Vascular Plants

Measures of effects to the soil community (Assessment Endpoint # 4) were evaluated utilizing the HQ method by comparing the measured concentrations of metals in soils to the soil BM values that were selected for the SLERA described in Section 2.3.2.1.1. These soil BMs provide more conservative values for assessing risk to this diverse community of soil microorganisms, earthworms, and other soil dwelling organisms. Table 2 presents the final soil BMs used for screening the risk to the soil community.

Measures of effects to vascular plants (Assessment Endpoint # 5) were evaluated utilizing the HQ method by comparing the measured concentrations of metals in soils to the BM values for terrestrial vascular plants presented in Table 3 derived from Efroymson *et al. (*1997a).

Risk was calculated for soil microorganisms and vascular plants exposed to soil at MA and at four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. If the concentration of a COPC measured in soil exceeded the plant BM (Table 3) or the soil BM (Table 2), soil microorganisms or vascular plants were considered at risk from exposure to that metal at that location.

4.3.8 Risk Assessment Method for Amphibians

Limited studies have been conducted in which adverse chronic effects of exposure to metals on amphibians have been evaluated. Appendix K presents the TRVs that were derived from these studies. The majority of the studies evaluated adverse effects to amphibians from exposure to metals in water (Al, Cd, Cr, Cu, Pb, Mg and Zn). Very few studies were located that evaluated exposure to metals in sediment (Cd and Zn), or dietary exposure (Cd and Pb). No studies were available on the adverse effects of U to amphibians.

Measures of effects to amphibians (Assessment Endpoint 17) were evaluated utilizing the HQ method by comparing the measured concentrations of metals in surface water and sediment to the amphibian TRVs presented in Table 17a and Appendix K. Only COPCs for which TRVs are available are included on the tables. If a TRV was not available, no conclusions regarding risk could be made. Risk was calculated to amphibians at two AOIs in the MA (Pit 3 and Pit 4) and at six AOIs in the PIA (Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Upper Blue Creek, Middle Blue Creek, and Lower Blue Creek.).

4.3.9 Risk Assessment Method for Wetland Plant and Wetland Invertebrate Communities

Measures of effects to wetland plants (Assessment Endpoint 18) were evaluated utilizing the HQ method by comparing the measured concentrations of metals in sediment to the BM values for terrestrial vascular plants presented in Table 3 derived from Efroymson *et al.* (1997a).

A limited number of studies were located to evaluate the adverse effects of exposure to metals to wetland plants. Subsequently, the BM values that have been derived for terrestrial vascular plants were used to assess the risk to wetland plants.

Measures of effects to wetland invertebrates (Assessment Endpoint 19) were evaluated utilizing the HQ method by comparing the measured concentrations of metals in sediment to the sediment BM values that were selected for the SLERA described in Section 2.3.2.1.2. Table 2 presents the final sediment BMs used for screening the risk to wetland invertebrates.

Risk was calculated for wetland plants and wetland invertebrates exposed to sediment at two AOIs in the MA (Pit 3 and Pit 4) and at six AOIs in the PIA (Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Upper Blue Creek, Middle Blue Creek, and Lower Blue Creek.). If the concentration of a COPC measured in sediment exceeded the plant BM (Table 3) or the sediment BM (Table 2), wetland plants or wetland invertebrates were considered at risk from exposure to that metal at that location.

4.3.10 Total Ionizing Radiation Assessment

The definitive risk characterization for this BERA will continue with USDOE (2002) sum-of-the-fractions approach by conducting site-specific screening method using central tendency (mean or median) radionuclide concentrations taking into account the spatial distribution of TIR (Assessment Endpoints 20 to 22). It will follow the same procedures as defined in the SLERA (See Section 2.3.2.3), but will substitute maximum radionuclide concentrations with central tendency concentrations to compare with the conservative limiting BCG.

4.4 Site-Specific Aquatic Studies

Site-specific aquatic studies were performed in March 2003 for the purpose of supporting the BERA by addressing some of the uncertainties that will be defined in the BERA related to aquatic habitats and communities of Blue Creek. These studies provided data on the aquatic habitats and the macroinvertebrate communities associated with the Eastern Drainage and Blue Creek and assessed the potential impact of mine-related metals from the Eastern Drainage to Blue Creek. In addition, the potential bioaccumulation of COPCs by the macroinvertebrate community was also assessed. The sampling locations and methodology for these studies are provided in the Data Summary Report (Appendix O).

4.5 Verification of Analysis Plan (Step 5)

Step 5 of the eight-step Superfund process evaluates whether the hypotheses, sampling plans, exposure pathways and measurable attributes are appropriate for the ERA. The development of this ERA was monitored throughout the process with the direction of the EPA/ERT work assignment manager (WAM) and communications with EPA Region X and the Biological Technical and Advisory Group (BTAG).

5.0 ANALYSIS PHASE

The analysis phase is Step 6 of the eight-step Superfund process (USEPA 1997). It is the technical evaluation of existing and potential exposure and ecological effects at the site based on the information collected during Steps 1 through 5.

The analysis phase examines the two primary components of risk, exposure and effects. The objective is to provide the ingredients necessary for determining or predicting ecological responses under exposure conditions. The assessment endpoints and conceptual models developed during problem formulation provide the focus and structure for the analyses. Measures of effects are the critical measurable attributes for this BERA since a chemical risk causing adverse effects is necessary for the selection of any remedial action under CERCLA (USEPA 1998, USEPA 1997).

The analysis phase is subdivided into three sections - Characterization of Ecosystems, Exposure, and Effects.

5.1 Characterization of Ecosystems

Habitat types at the Midnite Mine site include upland, riparian and wetland, riverine, and lacustrine. A characterization of the aquatic, riparian/wetland, and terrestrial ecosystems was presented in the Technical Memorandum, *Ecological Characterization of Midnite Mine* (URS 2000). An overview of these ecosystems was described in Section 2.2.1.

5.1.1 Ecosystem Data

5.1.1.1 Surface Water Quality

Mined Area

Tables M1 to M5 (Appendix M) present the surface water quality data for the collection pools in the MA (Pit 3, Pit 4, PCP, Blood Pool, and Outfall Pool). With the exception of Pit 4, the surface water in the collection pools in the MA were characterized with low pH (4.1 to 5.4), high hardness (1,285 to 2,808 mg/L), high sulfate (SO_4) concentrations (1,638 to 3262 mg/L), high conductivity (2,377 to 3,439 microsiemens per centimeter [μS/cm]), and high concentrations of dissolved solids (2,354 to 4,528 mg/L). The pH of Pit 4 was near neutral, and values for hardness, SO_4, conductivity, and dissolved solids at Pit 4 were an order of magnitude lower than those at other locations in the Mined Area (Table M 2). At all MA locations, nutrient concentrations were low and dissolved oxygen concentrations were high.

Potentially Impacted Area

Tables M6 to M9 (Appendix M) present the surface water quality data for the Western Drainage, Central Drainage, Upper Eastern Drainage, and Lower Eastern Drainage. The surface water in all the drainages was characterized by high concentrations for hardness (1,640 to 2,051 mg/L), SO_4 (1,507 to 2,156 mg/L), conductivity (2,249 to 2,698 μS/cm), and total dissolved solids (2,370 to 3,107 mg/L). Differences in water characteristics among the drainages did not appear to be related to proximity to the MA. Central and Western drainages had low pH; Upper Eastern and Lower Eastern drainages had near neutral pH values. Nutrient levels were low in all drainages.

Tables M10 to M12 present the surface water quality data for Upper, Middle, and Lower Blue Creek. The influence of the mine drainage was evident by the changes in several water quality characteristics from the Upper Blue Creek to Middle Blue Creek, for example, total hardness concentrations increased from an average of 62 mg/L at Upper Blue Creek to 964 mg/L at Middle Blue Creek, SO_4 increased from an average of 28 mg/L at Upper Blue Creek to 881 mg/L at Middle Blue Creek, conductivity increased from an average of 134 μS/cm at Upper Blue Creek to 1,340 μS/cm at Middle Blue Creek, and the chemical oxygen demand (COD) increased from 9.9 mg/L at Upper Blue Creek to 35.5 mg/L at Middle Blue Creek. The pH in all stretches of the creek was neutral. Nutrient levels in Blue Creek were low.

5.1.1.2 Sediment Quality

<u>Mined Area</u>

Table 13 presents the sediment quality data for Pit 3 within the MA. Sulfate, phosphorus, and total organic carbon concentrations were high.

<u>Potentially Impacted Area</u>

Tables M 14a, M14b, and M 15 (Appendix M) present the sediment quality analyses for the Western Drainage, Central Drainage, and Eastern Drainage. Sulfate, phosphorus, and total organic carbon concentrations were high.

Tables M 16 to M 18 (Appendix M) present the sediment quality analyses for Upper, Middle, and Lower Blue Creek. Higher SO_4 concentrations were observed at the Middle and Lower Blue Creek compared to the Upper Blue Creek.

5.1.1.3 Soil Quality

<u>Mined Area</u>

Surface soil (0-5 cm) quality was tested at 16 locations in the MA (Table M 19). Some parameters, such as pH, total organic carbon, alkalinity, phosphorus, and SO_4, displayed high spatial heterogeneity.

<u>Potentially Impacted Area</u>

Tables M 20 to M 23 (Appendix M) present the surface and subsurface (5-20 cm) soil data for the Northeast PIA and the Southwest PIA. Only a limited number of soil quality parameters were evaluated for subsurface soil samples. Soil (both surface and subsurface) pH was generally about 6.0 to 6.5.

Tables M 24 to M 27 (Appendix M) present the surface and subsurface soil results the East Haul Road and West Haul Road. Only a limited number of soil quality parameters were evaluated for subsurface soil samples. East and West Haul Roads had similar values for both subsurface and surface soils for most tof the parameters. Surface and subsurface soil pH values were generally around 6.0 to 7.0, with the exception of one subsurface soil sample at East Haul Road, which had a pH of 4.8 (Table M 26).

5.2 Characterization of Exposure

Two primary modes of exposure - abiotic and total exposure -are evaluated in this BERA. Abiotic refers to exposure from the environmental media including surface water, sediments, and soils. Total exposure refers to the abiotic exposure plus the dietary component. The dietary component was characterized by either site-specific tissue analyses or literature-derived BAFs.

5.2.1 Surface Water Metals Data

Appendix D presents analyses for surface water total and dissolved metals. Tables D-1 to D-16 provide the results for the total metals in surface water and Tables D-17 to D-31 provide the results for dissolved metals in surface water.

Only the maximum concentrations as total metals in surface water were used for characterizing risk to aquatic communities. For the food chain modeling both maximum and central tendency concentrations as total metals were used for characterizing risk.

The highest contaminant concentrations (particularly Al, Be, Cd, Cr, Co, Cu, Mn, Ni, Se, U, and Zn) in surface water for total metals occurred in the MA at Pit 3, Blood Pool, and PCP based on maximum concentrations and central tendency concentrations (Tables D-1, D-3, and D-4). The COPCs were present at lower concentrations at Pit 4 in the MA, but several contaminants, particularly Ni and U, were measured at high levels (Table D-2). The Outfall Pond had the lowest concentrations of COPCs with the exception of Ba (Table D-5).

Contaminant concentrations in the surface water for total metals for the drainages revealed an attenuation of contaminant levels compared to the higher concentrations measured in the MA; however, the same group of COPCs identified in the MA were also prominent in the PIA drainages (Tables D-6 to D-11). Uranium levels, along with Cd, Cu, Co, Mn, Ni, Ag, and Zn, were present at the highest concentrations at the Central Drainage (Table D-9). An attenuation for this same group of COPCs from higher concentrations at Upper Eastern Drainage to lower concentrations at Lower Eastern Drainage was also evident when comparing the maximum concentrations (Tables D-10 and D-11).

In Blue Creek the highest COPC concentrations (particularly for Ag, Cu, Mn, Ni, and U) in surface water for total metals occurred at Middle Blue Creek compared to lower levels measured at Upper and Lower Blue Creek stations (Tables D-12 to D-14). Several COPCs, including Cu, Mn, Ni, U, and Zn, tended to be at lower levels at Middle Blue Creek than at the Lower Eastern Drainage based on either maximum or central tendency concentrations (Tables D-11 and D-13).

5.2.2 Instream Sediment Metals Data

Appendix E presents the metal analyses for instream sediments for composite sampling and grab sampling. Tables E-1 to E-14 provide the results of the metal analyses for the composite sediments and Tables E-15 to E-29 provide the results of the metal analyses for the grab sediments.

Since the SLERA retained a higher number of COPCs based on the grab sediments compared to the composite samples and the maximum concentrations were higher for the grab sediments than the composite sediments (See Section 2.4.1.2 and Tables 8 and 9), only the metal concentrations for the grab sediments were used in the BERA. Maximum concentrations as total metals were used for characterizing risk to aquatic communities, wetland plant communities, and wetland invertebrate communities. For the food chain modeling both maximum and central tendency concentrations for the metals measured in grab sediments were used.

The highest concentrations of COPCs in grab sediments in the MA, particularly Al, Be, Cd, Co, Cu, Mn, Ni, U, and Zn, were measured at the PCP (Table E-18). The highest concentrations of COPCs in the PIA grab sediments for the drainages occurred at the Central Drainage, particularly for Co, U, and Zn and at the Lower Eastern Drainage, particularly for Mn and Ni (Tables E-21 and E-23).

Middle Blue Creek had the highest maximum concentrations of several COPCs, particularly for As, Ba, Cd, Co, Mn, Ni, U, and Zn compared to Upper Blue Creek and Lower Blue Creek (Tables E-24 to E-26). Concentrations of COPCs tended to be at the lowest levels at FDR Lake (Table E-27).

5.2.3 Riparian Sediment Metals Data

Appendix F presents the metal analysis for the riparian sediments collected at six AOIs in the PIA. Tables F-1 to F-6 provide the results of the metal analyses for the riparian sediments. For the food chain modeling both maximum and central tendency concentrations as total metals were used.

The highest concentrations of COPCs in the riparian sediments occurred at the Central Drainage, particularly for As, Be, Co, Cu, U, and Zn based on maximum and central tendency concentration (Table F-2). The highest concentrations for Cd and Mn occurred at the Lower

Eastern Drainage (Table F-4). Lowest concentrations of COPCs were measured at Lower Blue Creek (Table F-6).

5.2.4 Soil Metals Data

Appendix G presents the metal analyses for soils collected at the MA and four AOIs in the PIA. Both surface and subsurface soils were collected. Tables G-1 to G-6 provide the results of the metal analyses for the surface soils and Tables G-7 to G-11 provide the results of the metal analyses for subsurface soils.

Maximum concentrations of metals in surface level and subsurface soils were used for characterizing risk to terrestrial soil and plant communities. For the food chain modeling both maximum and central tendency concentrations for the surface soils were used.

It appeared that higher contaminant concentrations (particularly Al, As, Cd, Cr, Co, Cu, Mn, Mo, Ni, Se, U, V, and Zn) occurred in the surface soils in the MA.

Except for U, most of the COPCs did not exhibit a high degree of variability based on maximum and central tendency concentrations between the four AOIs in the PIA (Tables G-2 to G-5). Uranium concentrations were the highest at the West Haul Road followed by the East Haul Road (Tables G-4 and G-5).

Subsurface soils were not collected in the MA. COPCs followed a similar trend as the surface soils with little variability between the AOIs. The highest U levels for the subsurface soils occurred at the East Haul Road (Table G-9).

5.2.5 Total Ionizing Radiation Data

Six site-related radioisotopes – ^{226}Ra, ^{228}Ra, ^{232}Th, ^{234}U, ^{235}U, and ^{236}U – were measured in surface waters, instream sediments, riparian sediments, and soils in the MA and PIA. Total ionizing radiation exposure was calculated based on sum-of-the-fractions method (USDOE 2002) as described in Section 2.3.2.3. The sum-of-the fractions approach combines the exposure media to derive the TIR exposure to aquatic, riparian, and terrestrial systems.

Appendix H (Tables H-1 to H-37) provides the TIR calculations based on maximum concentrations of the radioisotopes that were used for characterizing risk for the SLERA and Appendix S (Tables S-1 to S-37) provides the TIR calculations based on central tendency concentrations of the radioisotopes that were used for characterizing risk for the BERA.

5.2.6 Tissue Metals Data

Appendix N presents the metal analyses of the site- specific biological sampling for aquatic plants and invertebrates, riparian plants and invertebrates, and terrestrial plants and invertebrates. The sampling methods and sampling locations are described in Section 4.2.3 and Figure 8.

For food chain modeling the maximum concentration of metals in invertebrate and plant tissues were used.

5.2.6.1 Terrestrial Invertebrate Tissue Data

Table N-1 (Appendix N) presents the metals analyses for the terrestrial invertebrates collected at three upland sites situated in or along the perimeter of the MA designated as US1, US2, and US3 and one upland site in the PIA designated as US4 (Figure 8) (SMI 1999c). No trends on the distribution of COPCs for the terrestrial invertebrates between these sampling sites were apparent.

5.2.6.2 Riparian Invertebrate Tissue Data

Table N-2 (Appendix N) presents metals analyses for the riparian invertebrates collected in the PIA including Upper Blue Creek, Middle Blue Creek, Central Drainage, Eastern Drainage, and Western Drainage (Figure 8) (SMI 1999c). No trends on the distribution of COPCs were apparent.

5.2.6.3 Aquatic Invertebrate Tissue Data

Table N-3 (Appendix N) presents metals analyses for the aquatic invertebrates collected at Upper Blue Creek, Middle Blue Creek, Eastern Drainage, and Western Drainage (Figure 8) (SMI 1999c). Middle Blue Creek and the Eastern Drainage had higher concentrations of several COPCs, including Be, Cd, Mn, and Ni than Upper Blue Creek or the Western Drainage. Higher U concentrations were also observed at Middle Blue Creek and the Eastern and Western Drainages than at Upper Blue Creek.

5.2.6.4 Terrestrial Plant Tissue Data

Table N-4 (Appendix N) presents the metals analyses for the aboveground tissue for the terrestrial plants and Table N-5 presents the metal analyses for the root tissue for the terrestrial plants (SMI 1999b). Both aboveground plant tissue and root tissue were collected at three upland sites situated in or along the perimeter of the MA designated as US1, US2, and US3 and one upland site in the PIA designated as US4 (Figure 8).

The highest levels in the aboveground tissue for several COPCs including Cd, Mn, Ni, and U were measured at US2 in the MA (Table N-4). The root tissue had higher concentrations of metals than the aboveground tissue (Tables N-4 and –5). The highest levels of As, Be, Cd, Cu, Co, Cr, Mn, Ni, and U in root tissue were measured at US2 in the MA (Table N-5).

5.2.6.5 Riparian Plant Tissue Data

Table N-6 (Appendix N) presents the metals analyses for the aboveground tissue for the riparian plants and Table N-7 presents the metal analyses for the root tissue for the riparian plants (SMI 1999b). Both aboveground plant tissue and root tissue were collected at Upper Blue Creek, Middle Blue Creek, Central Drainage, Eastern Drainage, and Western Drainage (Figure 8).

No trends on the distribution of COPCs for the aboveground tissue were apparent. The highest U levels for the aboveground tissue were measured in the Central Drainage followed by the Western Drainage.

5.2.6.6 Aquatic Plant Tissue Data

Table N-8 (Appendix N) presents metals analyses for the aquatic plants collected at Upper Blue Creek, Middle Blue Creek, Eastern Drainage, and Western Drainage (Figure 8) (SMI 1999b). Relatively higher levels of Mn, Ni, U, and Zn in the aquatic plants were measured at Middle Blue Creek than Upper Blue Creek. The highest levels for U in aquatic plants were measured at the Western Drainage (Table N-8).

5.3 Characterization of Effects

5.3.1 Food Chain Models

Receptor species from several trophic levels were used for the food chain modeling to characterize exposure to the Assessment Endpoints 6 through 16. Organisms which are likely to be exposed to contaminants because of specific behaviors, patterns of habitat use, or feeding habits were selected for this evaluation. The terrestrial surrogate receptor species selected for modeling exposure included the meadow vole, white-tailed deer, coyote, bobcat, deer mouse, masked shrew, cliff swallow, song sparrow, American robin, great horned owl, American kestrel, and spruce grouse. Surrogate receptors selected to model exposure utilizing aquatic or riparian habitats included the muskrat, raccoon, mink, mallard, Wilson's snipe, great blue heron, and the bald eagle. Appendix L provides the life history and exposure profiles for each of these receptors. The life history parameters used in the models are summarized in Tables 18 and 19.

The methods for characterizing risk to Assessment Endpoints 6 through 16 using food chain models was described in Section 4.3.2. Figures 9 to 12 present a schematic depiction of the food chain exposure models. These 19 receptors should be viewed as models for the assessment endpoints and not the assessment endpoints themselves. Appendix J presents the

TRVs of the COPCs to wildlife receptors, which were used for deriving the NOAEL and LOAEL values. Table 16 lists the TRVs that were used in the models.

The mechanisms of release of COPCs and the resulting pathways of exposure through air, water, sediment, and soil, are depicted in Figures 4 through 7. Food chain Models 1 and 2 were used to estimate risk from abiotic exposures to instream sediments, riparian sediments, soils, and surface water. Model 1 used conservative (maximum values) of the metal concentrations in the environmental media and conservative life history parameters (minimum body weights and maximum ingestion rates). Model 2 used central tendency concentrations of the metals in the environmental media and representative life history parameters. Model 3 used the same conservative abiotic exposures used in Model 1 plus it incorporated the maximum concentration for the dietary component. Model 4 used the same abiotic exposures used in Model 2 plus it incorporated the maximum concentration for the dietary component.

Thirteen aquatic AOIs were evaluated using food chain models. Five AOIs were in the MA, and eight were in the PIA. In the MA (including locations Pit 3, Pit 4, PCP, Blood Pool, and Outfall Pond), Model 1 was used to provide conservative estimates of risk from abiotic exposure at instream locations for six aquatic or semi-aquatic receptors (raccoon, mink, mallard, Wilson's snipe, great blue heron, and bald eagle) (Table 21). Sediment and water concentrations were collocated. Model 2 was used to provide representative estimates of risk from abiotic exposure for four receptors (raccoon, mink, mallard, and Wilson's snipe); model 2 was not run for the great blue heron or bald eagle because HQs for Model 1 for these species were all less than 1.0. Site-specific tissue data were not available for sampling locations in the MA; therefore, models 3 and 4 were run for only three receptors (mink, great blue heron, and bald eagle), using water-to-fish BAFs to estimate dietary tissue concentrations (See Section 4.3.5).

For the aquatic ecosystems in the PIA (Western Drainage, Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Upper Blue Creek, Middle Blue Creek, Lower Blue Creek, and FDR Lake), Model 1 was used to provide conservative estimates of risk from abiotic exposure at instream locations for muskrat, raccoon, mink, mallard, Wilson's snipe, great blue heron, and bald eagle (Table 21). Sediment and surface water concentrations were collocated. Model 2 was used to provide representative estimates of risk from abiotic exposure for muskrat, raccoon, mink, mallard, and Wilson's snipe. Model 2 was not run for the great blue heron or bald eagle, since the more conservative Model 1 results for the HQ's for these species were all less than 1.0.

Assessment endpoints for Models 3 and 4 included herbivorous mammals (muskrat), omnivorous mammals (raccoon), piscivorous mammals (mink), omnivorous birds (mallard), and piscivorous birds (great blue heron and bald eagle) (Table 21). Models 3 and 4 for the muskrat, raccoon, and mallard used site-specific, collocated tissue data from the location in close proximity with the most conservative (higher) maximum concentrations as follows: Western Drainage and Central Drainage used tissue concentrations from Western Drainage; Upper Eastern Drainage and Lower Eastern Drainage used tissue data from Eastern Drainage; Upper Blue Creek used tissue concentrations from Upper Blue Creek; and Middle Blue Creek, Lower Blue Creek, and

FDR Lake used tissue concentrations from Middle Blue Creek. Being more conservative, instream (aquatic) rather than riparian plant and invertebrate tissue concentrations were used. Because site-specific fish tissue data were not available, BAFs were used to estimate dietary concentrations of COPCs for the mink, the great blue heron and the bald eagle. For the Wilson's snipe, Models 3 and 4 were run using riparian rather than instream sediment.

Six riparian areas in the PIA were used for modeling, the muskrat and Wilson's snipe (Table 21), including Western Drainage, Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Middle Blue Creek, and Lower Blue Creek. Models 1 and 2 were used to provide conservative and representative estimates of risk, respectively, from abiotic exposure to riparian sediments. Instream surface water and riparian sediment concentrations were collocated. Models 3 and 4 were also run using riparian sediment concentrations for the Wilson's snipe. Instream invertebrate tissue rather than riparian invertebrate tissue concentrations were used in these models which provided a more conservative risk estimate. Models 3 and 4 used site-specific, collocated tissue data from the location in close proximity with the most conservative (higher) maximum concentrations as follows: Western Drainage and Central Drainage used tissue concentrations from Western Drainage; Upper Eastern Drainage and Lower Eastern Drainage used tissue data from Eastern Drainage; Upper Blue Creek used tissue concentrations from Upper Blue Creek; and Middle Blue Creek and Lower Blue Creek used tissue concentrations from Middle Blue Creek. For the muskrat, Models 3 and 4 were run using instream rather than riparian sediment concentrations, since the instream sediment concentrations were more conservative (higher).

Five terrestrial and/or upland AOIs were evaluated using the food chain models that included the MA and four AOIs in the PIA designated as Northeast PIA, Southwest PIA, East Haul Road, and West Haul Road. Models 1, 2, 3, and 4 were used to provide conservative and representative estimates of risk from abiotic and total exposure to soil and surface water. Twelve terrestrial receptors (meadow vole, white-tailed deer, coyote, bobcat, deer mouse, masked shrew, cliff swallow, song sparrow, American robin, great horned owl, American kestrel, and spruce grouse) were used for modeling exposure (Table 21). The song sparrow was used as a receptor for both the herbivorous and omnivorous birds. Models for the MA were run twice, once using COPC concentrations measured in surface water from Pit 3, and once using COPC concentrations measured in surface water collected in the PCP. The soil exposures for the AOIs in the PIA were modeled with surface water exposures that were in close proximity of the AOI and presented more conservative (higher) concentrations of contaminants in the surface water, as follows: Northeast PIA and East Haul Road used surface water concentrations from Upper Eastern Drainage, Southwest PIA used surface water concentrations from Central Drainage, and West Haul Road used surface water concentrations from Western Drainage. Modeling to characterize risk was performed for herbivorous mammals (meadow vole and white-tailed deer), omnivorous mammals (deer mouse), carnivorous mammals (coyote and bobcat), soil invertebrate feeding mammals (masked shrew), herbivorous birds (spruce grouse and song sparrow), omnivorous birds (song sparrow), carnivorous birds (great horned owl and American kestrel), soil invertebrate feeding birds (American robin), and insectivorous birds (cliff swallow). Models 3 and 4 used site-specific, collocated (in the MA or the PIA) tissue data (maximum concentrations) for the meadow vole, white-tailed deer, deer mouse, song sparrow, spruce grouse, and cliff swallow. Because site-specific tissue data for small mammals and soil invertebrates were not available, BAFs were used to estimate dietary concentrations of COPCs for the coyote, bobcat, masked shrew, American robin, American kestrel, and great horned owl (See Section 4.3.5).

The results of the food chain models are presented in the risk characterization (Sections 6.6 to 6.16).

5.3.2 Site-Specific Aquatic Studies

Recent surveys characterizing the aquatic habitats and communities residing in Blue Creek and the Eastern Drainage are limited (URS 2000, URS 2001a). Instream macroinvertebrate surveys that served to demonstrate the extent of the impact of the mine drainages discharging into Blue Creek via the Eastern Drainage were conducted in 1986-87 (Cairns, *et al*. 1988, Plotnikoff, *et al*.1988). More recent studies were conducted in March 2003 for this ERA and presented in the BERA of this report (See Appendix O). These 2003 studies include a survey of the macroinvertebrate communities in Blue Creek and the Lower Eastern Drainage.

6.0 RISK CHARACTERIZATION

Step 7 of the eight-step Superfund process (U.S. EPA 1997) focuses on the risk characterization which integrates exposure and effects data for estimating risks to assessment endpoints. The measures of effects are the critical measurable attributes for this BERA since a chemical risk causing adverse effects is necessary for the selection of any remedial action under CERCLA. Each of the following subsections reviews one assessment endpoint, the testable hypotheses and measurable attributes used to assess risk, and concludes with a determination of risk to that assessment endpoint.

The SLERA (Section 2.0) identified a list of COPCs. However, not all of those COPCs been carried through this BERA. Section 3.2 details the reasoning for excluding Al, Hg, Fe, and Mg from consideration in the aquatic portion of the BERA, and for excluding Al, Fe, and Mg in the terrestrial and riparian portions of the BERA. All of the other COPCs identified in the SLERA were carried through the BERA.

6.1 Assessment Endpoint #1: Viability and Function of the Periphyton Community

The ecological fitness and integrity of the periphyton community was evaluated based on the risk characterization that was derived for the SLERA as defined by the chemical analyses of surface water. Benchmark values utilized in the SLERA, derived primarily from NRWQC (See Section 2.3.2.1), were compared to the concentrations of contaminants in surface water to determine the HQ. Risk to the periphyton community was defined if the HQ was equal to or greater than 1.0, or the BM value was below the SDL. For this Assessment Endpoint, no additional data was collected to refine the risk estimates from the SLERA.

Fourteen COPCs measured as total metals in surface waters exceeded BM values associated with adverse effects to periphyton: Al, Ag, Ba, Be, Cd, Cr, Co, Cu, Mn, Ni, Pb, Se, U, and Zn (Table 22).

Eleven COPCs measured as dissolved metals in surface waters exceeded BM values associated with adverse effects to periphyton: Ag, Ba, Be, Cd, Cr, Co, Cu, Mn, Ni, Pb, and Zn (Table 23).

6.1.1 Risk Characterization Summary for the Periphyton Community

All AOIs are at risk based on metals concentrations in the surface waters (Tables 22 and 23). At Pit 3, Blood Pool, and the PCP, 14 COPCs as total metals exceeded BM values. Pit 4 and the Outfall Pond had fewer COPCs which exceeded BM values, and the HQs were one to three orders of magnitude lower for most of the COPCs. Pit 4 had 11 COPCs as total metals which exceeded BM values, and the Outfall Pond had seven COPCs which exceeded BM values (Table 22).

The HQs for most of the COPCs for the AOIs in the PIA were often one to three orders of magnitude lower than the HQs at Pit 3, Blood Pool, and the PCP. The Central Drainage had the highest HQs for Cd, Co, Cu, Mn, and Ni relative to the other AOIs in the PIA. The Northeastern Drainage had the highest HQs for Al, Ba, Be, Cr, Pb, and U relative to the other AOIs in the PIA. The highest HQs for U were at Northeastern and Central Drainages. Upper Blue Creek has seven COPCs as total metals which exceeded BM values compared to Middle Blue Creek and Lower Blue Creek with 11 and nine COPCs which exceeded BM values, respectively (Table 22).

6.2 Assessment Endpoint #2: Viability and Function of the Benthic Macroinvertebrate Community

The viability of the benthic macroinvertebrate community and organism survivability was evaluated through chemical analyses of sediment and surface water, and a field survey of the benthic macroinvertebrate community.

6.2.1 Comparison of Site-Specific Sediment Metal Concentrations to Benchmark Values

The ecological fitness and integrity of the benthic invertebrate community was evaluated based on the risk characterization that was derived for the SLERA. Risk to the benthic macroinvertebrate community was defined if the HQ was equal to or greater than 1.0, or the BM value was not available, or the BM value was below the SDL. Benchmark values for surface water and sediments utilized in the SLERA, (See Section 2.3.2.1) were compared to the concentrations of contaminants detected in surface water and sediments.

The same COPCs in surface water that were associated with adverse effects to periphyton (Assessment Endpoint #1) are also associated with adverse effects to benthic invertebrates (Tables 22 and 23).

6.2.2 Benthic Stream Survey Results

A benthic survey performed in March 2003 showed that the macroinvertebrate communities in Blue Creek below the confluence of the Eastern Drainage and the Eastern Drainage are impacted relative to Upper Blue Creek. A full description of the survey can be found in Appendix O. The benthic macroinvertebrate community in the Lower Eastern Drainage and at three stations in Middle and Lower Blue Creek exhibited an almost complete lack of mayflies compared to Upper Blue Creek stations, and a shift of community structure appeared evident. In Middle Blue Creek, environmental stresses related to Midnite Mine drainage include elevated metals in stream channel sediments and water, as well as water quality impacts (e.g. high hardness, conductivity, sulfate, and dissolved solids). In addition, the flow volumes and water quality vary significantly depending on whether the WTF is discharging water.

A storm event that preceded the benthic sampling may have affected the results of benthic sampling at the Middle Blue Creek station closest to Upper Blue Creek. Benthic organisms may have been flushed downstream from upper Blue Creek, contributing to an increased species richness measured at the immediate downstream station below the confluence of the Eastern Drainage.

6.2.3 Risk Characterization Summary for the Benthic Macroinvertebrate Community

The risk characterization summary provided for Assessment Endpoint #1 (Section 6.1) for total and dissolved metals in surface water is the same for this Assessment Endpoint (Tables 22 and 23).

All AOIs are at risk from the above COPCs in sediments. The PCP had the highest number of COPCs (13) and the highest HQs for Ba, Be, Cd, Co, Cu, Mn, Ni, U, and Zn, based on grab sediments (Table 24). Pit 3 and the Outfall Pond ranked second and third in the number of COPCs which exceeded BM values with nine and eight, respectively. Pit 4 had six COPCs that exceeded BM values, and the Blood Pool had 8 (Table 24). Antimony, Se, and Ag had BM values below the SDL at a number of AOIs in the MA and PIA.

The Central Drainage had nine COPCs which exceeded BM values in grab sediments. The highest HQ for U in the PIA was at the Central Drainage. The Upper and Lower Eastern Drainages had seven and nine COPCs which exceeded BM values, respectively. Middle Blue Creek and Lower Blue Creek had 10 and five COPCs as grab sediments which exceeded BM values, respectively. Upper Blue Creek and FDR Lake had the lowest number of COPCs exceeding BM values, with four and two, respectively.

6.3 Assessment Endpoint #3: Viability and Function of the Fish Community

The ecological fitness and integrity of the fish community was evaluated based on the risk characterization that was derived for the SLERA. Benchmark values utilized in the SLERA, derived primarily from NRWQC (See Section 2.3.2.1), were compared to concentrations of contaminants in surface water to determine the HQ. Risk to the fish community was defined if the HQ was equal to or greater than 1.0, or the BM value was below the SDL. For this Assessment Endpoint, no additional data was collected to refine the risk estimates from the SLERA.

Fourteen COPCs measured as total metals in surface waters exceeded BM values associated with adverse effects to fish: Al, Ag, Ba, Be, Cd, Cr, Co, Cu, Mn, Ni, Pb, Se, U, and Zn (Table 22).

Eleven COPCs measured as dissolved metals in surface waters exceeded BM values associated with adverse effects to fish: Ag, Ba, Be, Cd, Cr, Co, Cu, Mn, Ni, Pb, and Zn (Table 23).

6.3.1 Risk Characterization Summary for the Fish Community

All AOIs are at risk from metals concentrations in surface water (Tables 22 and 23). At Pit 3, Blood Pool, and the PCP, 14 COPCs as total metals exceeded BM values. Pit 4 and the Outfall Pond had fewer COPCs which exceeded BMs, and the HQs were one to three orders of magnitude lower for most of the COPCs. Pit 4 had 11 COPCs as total metals which exceeded BM values, and the Outfall Pond had seven (Table 22).

The HQs for most of the COPCs for the AOIs in the PIA were one to three orders of magnitude lower than the HQs at Pit 3, Blood Pool, and the PCP. The Central Drainage had the highest HQs for Cd, Co, Cu, Mn, and Ni relative to the other AOIs in the PIA. The Northeastern Drainage had the highest HQs for Al, Ba, Be, Cr, Pb, and U relative to the other AOIs in the PIA. The highest HQs for U were at Central and Northeastern Drainages. Upper Blue Creek had seven COPCs as total metals which exceeded BM values compared to Middle Blue Creek and Lower Blue Creek with 11 and nine, respectively (Table 22).

6.3.2 Overall Characterization of Risk to Aquatic Communities (Assessment Endpoints 1, 2, 3)

It is recognized that risk based exclusively on screening level BM values presents a weak line of evidence. However, even if additional site-specific studies were conducted to improve upon the weight-of-evidence, risk to the aquatic communities would still be expected for the MA. In addition to the poor water quality conditions (low pH, high SO_4, high hardness) in the lacustrine habitats, the high metals concentrations in surface water and sediment pose substantial risk. The PIA drainages are also characterized by poor water quality; additionally several flow intermittently or have low-flow conditions that could impact supporting and sustaining a diverse aquatic community. However, the wide range and magnitude of COPCs in the PIA drainages would be expected to pose risk to the aquatic communities.

The studies conducted in March 2003 indicated a shift in macroinvertebrate communities from Upper to Middle and Lower Blue Creek (Appendix O). Upper Blue Creek is characterized by low hardness, low SO_4 concentrations, and low total dissolved solids. Middle and Lower Blue Creek are influenced by water from the Eastern Drainage that increases metals, hardness and SO_4 concentrations, and conductivity. However, the impact of the Eastern Drainage on the aquatic communities of Blue Creek is associated with some uncertainty as described in Appendix O.

There appears to be risk associated with mine-related COPCs, but the magnitude of the risk and the links to causative factors in water and sediment chemistry are confounding. The limited data collected for this study does not address the differential effects of in-place COPCs versus COPCs released from the mine versus water quality parameters.

6.4 Assessment Endpoint #4: Viability and Function of the Terrestrial Soil Community

To evaluate risk to the terrestrial soil community, measured concentrations of metals in surface and subsurface soils were compared to the soil BM values selected for the SLERA. (Section 2.3.2.1, Table 2). If the concentration of a COPC in soil exceeded the BM, soil microorganisms were considered to be at risk.

Surface Soils

Table 26 and the following discussion summarize the calculated risk for soil microorganisms exposed to surface soils at the MA, Northeast PIA, Southwest PIA, East Haul Road and West Haul Road.

Mined Area: Calculated HQs exceeded or were equal to1.0 for As, Cd, Cr, Co, Cu, Pb, Mn, Mo, Ni, Se, Tl, U, V, and Zn indicating that soil microorganisms are at risk.

Northeast PIA: Calculated HQs exceeded 1.0 for As, Cr, Mn, U, V, and Zn indicating that soil microorganisms are at risk.

Southwest PIA: Calculated HQs exceeded 1.0 for Cr, Mn, U, V, and Zn indicating that soil microorganisms are at risk.

East Haul Road: Calculated HQs exceeded or were equal to 1.0 for As, Cr, Co, Cu, Mn, Mo, Ni, U, V, and Zn indicating that soil microorganisms are at risk.

West Haul Road: Calculated HQs exceeded or were equal to1.0 for As, Cr, Cu, Mn, Mo, U, V, and Zn indicating that soil microorganisms are at risk.

Subsurface Soils

Table 27 and the following discussion summarize the calculated risk for soil microorganisms exposed to subsurface soils at the Northeast PIA, Southwest PIA, East Haul Road and West Haul Road.

Northeast PIA: Calculated HQs exceeded 1.0 for As, Cr, Mn, U, and V indicating that soil microorganisms are at risk.

Southwest PIA: Calculated HQs exceeded 1.0 for Cr, Mn, U, and V indicating that soil microorganisms are at risk.

East Haul Road: Calculated HQs exceeded or were equal to1.0 for As, Cr, Mn, Mo, U, V, and Zn indicating that soil microorganisms are at risk.

West Haul Road: Calculated HQs exceeded 1.0 for Cr, Mn, U, and V indicating that soil microorganisms are at risk.

6.4.1 Risk Characterization Summary for the Terrestrial Soil Community

Chromium, Mn, U, V, and Zn in surface soils exceeded the BM values at all AOIs (Table 26). Arsenic, Co, Cu, Mo, and Ni also exceeded BM values at some locations. Four COPCs exceeded the BM values at only the MA; Cd, Pb, Se, and Tl. Antimony, Ba, Be, and Ag in surface soils did not exceed BM values at any locations, and do not pose a risk to soil microorganisms.

Subsurface soil Cr, Mn, U, and V exceeded BM values at all AOIs in the PIA (Table 27). Arsenic exceeded its BM at some locations. Molybdenum and Zn exceeded BM values at only the East Haul Road. Antimony, Ba, Be, Cd, Co, Cu, Pb, Ni, Se, Ag, and Tl did not exceed BM at any locations, and do not pose a risk.

6.5 Assessment Endpoint #5: Viability and Function of the Terrestrial Plant Community

To evaluate risk to the terrestrial plant community, metals in soil were compared to the plant BM values described in the SLERA (Section 2.3.2.1, Table 3). If the concentration of a soil COPC exceeded the BM, terrestrial plants were considered to be at risk.

Surface Level Soils

Table 28 and the following discussion summarize the calculated risk for terrestrial plants exposed to surface soils at the MA, Northeast PIA, Southwest PIA, East Haul Road and West Haul Road.

Mined Area: Calculated HQs exceeded or were equal to1.0 for As, Cd, Cr, Co, Pb, Mn, Mo, Ni, Se, Tl, U, V, and Zn indicating that plants are at risk.

Northeast PIA: Calculated HQs exceeded 1.0 for As, Cr, Mn, U, V, and Zn indicating that plants are at risk.

Southwest PIA: Calculated HQs exceeded 1.0 for Cr, Mn, U, V, and Zn indicating that plants are at risk.

East Haul Road: Calculated HQs exceeded or were equal to1.0 for As, Cr, Co, Mn, Mo, Ni, U, V, and Zn indicating that plants are at risk.

West Haul Road: Calculated HQs exceeded 1.0 for As, Cr, Mn, Mo, U, V, and Zn indicating that plants are at risk.

Subsurface Soils

Table 29 and the following discussion summarize the calculated risk for terrestrial plants exposed to subsurface soils at the Northeast PIA, Southwest PIA, East Haul Road and West Haul Road.

Northeast PIA: Calculated HQs exceeded 1.0 for As, Cr, Mn, U, and V indicating that plants are at risk.

Southwest PIA: Calculated HQs exceeded 1.0 for Cr, Mn, U, V, and Zn indicating that plants are at risk.

East Haul Road: Calculated HQs exceeded or were equal to1.0 for As, Cr, Mn, Mo, U, V, and Zn indicating that plants are at risk.

West Haul Road: Calculated HQs exceeded 1.0 for Cr, U, and V indicating that plants are at risk.

6.5.1 Risk Characterization Summary for the Terrestrial Plant Community

Chromium, Mn, U, V, and Zn exceeded plant BM values at all of the AOIs. Arsenic, Co, Mo, and Ni exceeded the plant BM values at some locations. Cadmium, Pb, Se, and Tl exceeded the plant BMs at only the MA. Surface soil Sb, Ba, Be, Cu, Hg, and Ag did not exceed BM values at any locations, and do not pose a risk.

Subsurface soil Cr, U, and V exceeded the plant BM values at all of the AOIs in the PIA. Arsenic, Mn, and Zn exceeded the plant BM values at some locations. Molybdenum exceeded the plant BM only at East Haul Road. Subsurface soil Sb, Ba, Be, Cd, Co, Cu, Pb, Ni, Se, Ag, and Tl did not exceed BM at any locations, and do not pose a risk.

6.6 Assessment Endpoint #6: Viability and Function of the Herbivorous Mammal Community

Dietary exposure concentrations for the herbivorous mammal community were modeled using the meadow vole, white-tailed deer, and the muskrat. Exposure scenarios were modeled using the input parameters in Table 18. The meadow vole and the white-tailed deer were modeled for the terrestrial AOIs in the MA and PIA, while the muskrat was modeled for the instream and riparian AOIs in the PIA only.

Exposure scenarios for the meadow vole and white-tailed deer were calculated for the MA, the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern Drainage, Central Drainage, Upper Eastern Drainage, and the Western Drainage, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters.

Models 3 and 4 include food ingestion using site-specific terrestrial plant tissue. Of the four models, Model 3 is the most conservative. For the meadow vole both the aboveground plant tissue and root tissue were modeled separately. Model 3 for the meadow vole was calculated using the same parameters as Model 1 plus the maximum concentrations for both aboveground plant tissue and root tissue, respectively. Model 4 for the meadow vole was calculated using the same parameters as Model 2 plus the maximum concentrations for both the aboveground plant tissue and root tissue, respectively.

For the white-tailed deer, Model 3 was calculated using the same parameters as Model 1 plus the maximum concentration for the aboveground plant tissue. Model 4 for the white-tailed deer was calculated using the same parameters as Model 2 plus the maximum concentration for the aboveground plant tissue.

Exposure scenarios for the muskrat were calculated for the riparian/aquatic AOIs in the PIA including the Western, Central, Upper Eastern and Lower Eastern Drainages, Blue Creek, and FDR Lake. Model 1 was calculated using the maximum concentrations of the instream sediments and riparian sediments, along with the maximum concentrations of the collocated surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of instream and riparian sediments, along with the central tendency of the surface water and representative life history parameters. Model 3 was calculated using the same parameters as Model 1 plus the maximum concentrations for the aquatic plant tissue. Model 4 was calculated using the same parameters as Model 2 plus the maximum concentrations for the aquatic plant tissue.

6.6.1 Risk To Herbivorous Mammals in Terrestrial Ecosystems

<u>Mined Area</u>

The herbivorous mammal community in the MA is at risk from abiotic exposure to Se, U, and V based on Model 1 results (Table 39A). Arsenic, Mn, Mo, and Tl may pose a risk to the herbivorous mammal community.

Herbivorous mammals may be at risk from abiotic exposure to U based on Model 2 results.

Total exposure modeling indicates that the herbivorous mammal community is at risk from Mn, Se, and U (V was not analyzed in plant tissue) whether the dietary component was composed of 100% root tissue or 100% aboveground plant tissue based on Model 3 results. Additional metals (As, Cd, Cu, Pb, Tl, and Zn) may pose a risk to the herbivorous mammal community from total exposure based on Model 3 calculations (Table 39A).

Total exposure modeling based on Model 4 calculations indicates that the herbivorous mammal community is at risk from U when the diet is 100% root tissue. Arsenic, Cd, Mn, and Se may also pose a risk to herbivorous mammals in the MA (Table 39A).

Potentially Impacted Area

Of the four AOIs in the PIA, the herbivorous mammal community is at risk at the West Haul Road PIA from abiotic exposure to U based on conservative Model 1 calculations. Herbivorous mammals may also be at risk from abiotic exposure to U and V in the Northeast and Southwest PIA; As, U and V in the East Haul Road PIA; and Mo and V in the West Haul Road PIA (Table 39A).

No risk to herbivorous mammals was indicated at any of the terrestrial AOIs in the PIA based on abiotic exposure using representative Model 2 exposure parameters.

Total exposure modeling indicates that in each of the AOIs in the PIA, herbivorous mammals are at risk from Mn and U, when the diet was 100% root tissue. When the diet was 100% aboveground plant tissue, only the herbivorous mammal community utilizing the West Haul Road was at risk from U. Arsenic, Cd, Cu, Pb, Se, Tl, and Zn may pose a risk to herbivorous mammals from total exposure based on Model 3 calculations, depending on whether the diet was 100% root tissue or 100% aboveground plant tissue (Table 39A).

Total exposure modeling using representative Model 4 exposure parameters indicates that the herbivorous mammal community is at risk from U at each of the AOIs in the PIA when the diet is 100% root tissue. Arsenic, Cd, Mn, and Se may pose a risk from total exposure based on Model 4 results depending on the AOI (Table 39A).

6.6.2 Risk to Herbivorous Mammals in Aquatic Ecosystems

Mined Area

Risk to herbivorous mammals in the MA was not evaluated using food chain models because in situ aquatic vegetation data does not exist.

Potentially Impacted Area

The herbivorous mammal community is at risk from abiotic exposure to U in the Central Drainage based on results from Model 1 (Tables 40b and 41). It cannot be concluded that herbivorous mammals are not at risk from abiotic exposure to U in the Western Drainage, Mn and Se in the Lower East Drainage; and Mn in Middle Blue Creek.

The herbivorous mammal community is at risk from abiotic exposure to U in the Central Drainage. It cannot be concluded that herbivorous mammals are not at risk from abiotic Se exposure in the Lower East Drainage PIA based on Model 2 results (Tables 40b and 41).

Based on total exposure modeling using Model 3 exposure parameters, herbivorous mammals are at risk from Mn and U in all of the PIAs. Herbivorous mammals are also at risk from Ba in Upper Blue Creek, and from Ba, Cd, and Ni in Middle and Lower Blue Creek and FDR Lake. Depending on the PIA, it cannot be concluded herbivorous mammals are not at risk from exposure to As, Ba, Be, Cd, Co, Cu, Ni, Se, Ag, and Zn (Tables 40b and 41).

Using Model 4 exposure parameters, herbivorous mammals are at risk from exposure to Mn and U in all of the PIAs. Herbivorous mammals are also at risk from Ba in Upper Blue Creek, and from Ba, Cd, and Ni in Middle and Lower Blue Creek and FDR Lake. Depending on the PIA, it cannot be concluded that herbivorous mammals are not at risk from exposure to As, Ba, Be, Cd, Co, Cu, Se, Ag, and Zn (Tables 40b and 41).

6.6.3 Risk to Herbivorous Mammals in Riparian Ecosystems

The herbivorous mammal community is at risk from abiotic exposure to U in the Central Drainage riparian area based on results from Model 1 (Table 41).

Using Model 2 exposure parameters, it cannot be concluded that the herbivorous mammal community is not at risk from abiotic exposure to U in the Central Drainage riparian area (Table 41).

Total exposure of herbivorous mammals was not evaluated for the riparian areas because the aquatic vegetation tissue would be driving the risk having higher tissue concentrations than the riparian tissue.

6.6.4 Risk Characterization Summary for the Herbivorous Mammal Community

When the meadow vole (Table QA) was modeled, the consumption of 100% root tissue resulted in predicted risk from more COPCs and at higher HQs. It should be noted that 100% consumption of root tissue is not a representative meadow vole diet; a typical diet would consist of a larger percentage of aboveground tissue. The consumption of 100% roots results in a more conservative estimate of risk.

When white-tailed deer (Table QB) were modeled, calculated risk was driven by incidental ingestion of soil and surface water ingestion. Surface water bodies present a attraction for these animals consuming water and the mineral salt deposits around the perimeter.

When muskrat (Table QC 1 and QC 2) were modeled, calculated risk was driven by metals concentrations in aquatic vegetation.

6.7 Assessment Endpoint #7: Viability and Function of the Carnivorous Mammal Community

Dietary exposure concentrations for the carnivorous mammal community were modeled using the coyote and the bobcat. Four exposure scenarios were modeled using input parameters in Table 18.

Each exposure scenario was calculated for the MA and four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and from the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainage, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using literature-based BAF values for small mammals. Model 3 was calculated using the same parameters as Model 1 plus the maximum BAF value. Model 4 was calculated using the same parameters as Model 2 plus the maximum BAF value. Of the four models, Model 3 is the most conservative.

6.7.1 Risk to Carnivorous Mammals in Terrestrial Ecosystems

Mined Area

Model 1 calculations indicate that carnivorous mammals may be at risk from abiotic exposure to Se, U, and V.

When representative Model 2 exposure parameters are used, it cannot be concluded that carnivorous mammals are not at risk from abiotic exposure to U (Table 39a).

Total exposure modeling indicates that carnivorous mammals in the MA are at risk from exposure to Cd, Mo, Se, U, and Zn based on conservative Model 3 results. Lead and V may also pose a risk (Table 39a).

When Model 4 exposure parameters are used, it cannot be concluded that carnivorous mammals are not at risk from total exposure to Cd, Mo, Se, and U (Table 39a).

Potentially Impacted Area

It cannot be concluded that carnivorous mammals are not at risk from abiotic exposure to U in the West Haul Road PIA, using Model 1 exposure parameters (Table 39a).

No risk to carnivorous mammals was predicted using Model 2 calculations.

Total exposure modeling with conservative Model 3 indicates that carnivorous mammals are at risk at the Northeast PIA from exposure to Cd; and at the East and West Haul Road PIAs from exposure to Cd and U. Cadmium, Mo, Se, U, and Zn may pose a risk to carnivorous mammals depending on the AOI (Table 39a).

It cannot be concluded that carnivorous mammals are not at risk from exposure to Cd at each of the AOIs, and U at the East and West Haul Road (Table 39a).

6.7.2 Risk Characterization Summary for the Carnivorous Mammal Community

Conservative exposure models which include only site-specific metal concentrations in soil and surface water indicate Se, U and V in the MA may be of concern to carnivorous mammals (Tables QD and QE). Model 2, which incorporates central tendency site-specific metal concentrations in soil and surface water, indicates U may be of concern to carnivorous mammals that utilize the MA.

Models which incorporate predicted metal concentrations in prey species predict increased risk to carnivorous mammals that utilize the site, indicating food chain exposure may be significant for carnivorous mammals. Model 3 HQs indicate carnivorous mammals are at risk from exposure to Cd, Mo, Se, U, and Zn in the MA; and Cd and U in the PIAs. Lead and V may be of concern in the MA, and Mo, Se and Zn may be of concern in the PIAs.

Model 4 HQs indicate Cd, Mo, Se, and U may be of concern to carnivorous mammals in the MA; and Cd and U may be of concern in the PIAs.

6.8 Assessment Endpoint #8: Viability and Function of the Omnivorous Mammal Community

Dietary exposure concentrations for the omnivorous mammal community were modeled using the deer mouse and the raccoon. Exposure scenarios were modeled using input parameters in Table 18. The deer mouse was modeled for the terrestrial AOIs in the MA and PIA, while the raccoon was modeled for the water bodies in the MA and the riparian/aquatic AOIs in the PIA.

Exposure scenarios for the deer mouse were calculated for the MA, the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using site-specific terrestrial plant and invertebrate tissue. Model 3 was calculated using the same parameters as Model 1 plus the maximum concentrations for both aboveground plant tissue and invertebrate tissue. Model 4 for the deer mouse was calculated using the same parameters as Model 2 plus the maximum concentration for both the aboveground plant tissue and invertebrate tissue. Of the four models, Model 3 is the most conservative.

Exposure scenarios for the raccoon were calculated for the water bodies in the MA and the riparian/aquatic AOIs in the PIA. The AOIs in the MA include Pit 3, Pit 4, PCP, Blood Pool, and Outfall Pond. The AOIs in the PIA include the Western, Central, Upper Eastern and Lower Eastern Drainages, Blue Creek, and FDR Lake. Model 1 was calculated using the maximum concentrations of the instream sediments and the surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of instream sediments and surface water and representative life history parameters. Models 3 and 4 include food ingestion using site-specific aquatic plant and invertebrate tissue for the PIA only. No site-specific aquatic plant and invertebrate tissue for the MA was available. Model 3 was calculated using the same parameters as Model 1 plus the maximum concentrations for aquatic plant and invertebrate tissue. Model 4 was calculated using the same parameters as Model 2 plus the maximum concentrations for the aquatic plant and invertebrate tissue. Of the four models, Model 3 is the most conservative.

6.8.1 Risk to Omnivorous Mammals in Terrestrial Ecosystems

Mined Area

The omnivorous mammal community in the MA is at risk from abiotic exposure to As, Mn, Mo, Se, U, and V based on Model 1 results. Cadmium, Cr, Pb, Tl, and Zn may pose a risk.

It cannot be concluded that omnivorous mammals are not at risk from abiotic exposure to Se, U, and V based on Model 2 results (Table 39a).

Total exposure modeling for omnivorous mammals incorporated site-specific terrestrial invertebrate and aboveground plant tissue metal concentrations. A comparison of the HQs between Model 1 and Model 3 using the deer mouse (Table QF) indicates that risk in the MA is primarily attributed to abiotic exposure and not to the modeled dietary components (Table 39a).

Potentially Impacted Area

The omnivorous mammal community is at risk at the Northeast and Southwest PIA from abiotic exposure to V; at the East Haul Road from exposure to As, U, and V; and at the West Haul Road from exposure to U and V based on conservative Model 1. It cannot be concluded that omnivorous mammals are not at risk from abiotic exposure to As, Mo, Mn, Se, and U, depending on the AOI.

Representative Model 2 indicates possible risk from exposure to V at the Northeast and Southwest PIA, and U and V at the East and West Haul Roads (Table 39a).

Total exposure Model 3 indicates that omnivorous mammals are at risk at the Northeast PIA from exposure to Mn; at the Southwest PIA from Mn and U; at East Haul Road from As, Mn, and U; and at West Haul Road from Mn and U. Arsenic, Cd, Cu, Se, Tl, U, and Zn may pose a risk to omnivorous mammals depending on the AOI (Table 39a).

When Model 4 is used it cannot be concluded that omnivorous mammals are not at risk from exposure to Cd, Mn, Se, and U, depending on the AOI (Table 39a).

6.8.2 Risk to Omnivorous Mammals in Aquatic Ecosystems

Mined Area

Omnivorous mammals are at risk from abiotic exposure to U at Pit 3, Pit 4 and the PCP based on Model 1. It cannot be concluded that omnivorous mammals are not at risk from abiotic exposure to V at Pit 3 and Pit 4; and U and V at the Blood Pool and the Outfall Pond (Table 40a).

Using Model 2, it cannot be concluded that omnivorous mammals are not at risk from exposure to U at Pit 3, Pit 4 and the PCP (Table 40a).

Total exposure of omnivorous mammals was not evaluated in the MA.

Potentially Impacted Area

Omnivorous mammals are at risk from abiotic exposure to U in the Central Drainage, and Mn in Middle Blue Creek based on Model 1 (Table 40b). It cannot be concluded that omnivorous mammals are not at risk from abiotic exposure to Se and U in the Western Drainage; Se in the Central Drainage; U and V in the Upper East Drainage; and Mn, Se, U, and V in the Lower East Drainage.

Using Model 2, it cannot be concluded that omnivorous mammals are not at risk from exposure to U in the Central Drainage (Table 40b).

Based on total exposure using Model 3, omnivorous mammals are at risk from exposure to Mn and U in the Western, Central, and Upper Eastern Drainages, and Middle and Lower Blue Creek. Omnivorous mammals are at risk from total exposure to Mn, Se and U in the Lower East Drainage, and Mn in FDR Lake. It cannot be concluded that Ba, Cd, Mn, Se, and U do not pose a risk to omnivorous mammals depending on the AOI (Table 40b).

Using Model 4, omnivorous mammals are at risk from total exposure to U in the Western and Central Drainages, and from Mn in Middle Blue Creek, Lower Blue Creek, and FDR Lake. It cannot be concluded that Ba, Mn, Se and U do not pose a risk to omnivorous mammals depending on the AOI (Table 40b).

6.8.3 Risk Characterization Summary for the Omnivorous Mammal Community

Using the deer mouse (Table QF), metals concentrations in soil and surface water drive risk predictions. Omnivorous mammals are at risk from As, Mn, Mo, Se, U, and V in the MA, and As, U, and V in the PIAs. Omnivorous mammals also are at risk from Mn in terrestrial vegetation and invertebrates.

Using the raccoon (Table QG), omnivorous mammals are at risk from U in the MA, and V may be of concern. Only soil and surface water exposure were evaluated in the MA. In the PIAs, omnivorous mammals are at risk from sediment and surface water U in the Central Drainage, and Mn in Middle Blue Creek. Otherwise, predicted risk to omnivorous mammals is driven by metals in food items.

6.9 Assessment Endpoint #9: Viability and Function of the Piscivorous Mammal Community

Dietary exposures for piscivorous mammals were modeled using the mink. Four exposure scenarios were modeled using input parameters in Table 18, for the water bodies in the MA and the riparian/aquatic AOIs in the PIA. The AOIs in the MA include Pit 3, Pit 4, PCP, Blood Pool, and the Outfall Pond. The AOIs in the PIA include the Western, Central, Upper Eastern and Lower Eastern Drainages, Blue Creek, and FDR Lake. Model 1 was calculated using the maximum concentrations of the instream sediments and the surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of instream sediments and surface water and representative life history parameters. Models 3 and 4 include food ingestion using literature-based BAF values for fish. Model 3 was calculated using the same parameters as Model 1 plus the maximum BAF values for fish. Model 4 was calculated using the same parameters as Model 2 plus the maximum BAF values for fish. Of the four models, Model 3 is the most conservative.

6.9.1 Risk to Piscivorous Mammals in Aquatic Ecosystems

Mined Area

Piscivorous mammals are at risk from abiotic exposure to U at the PCP based on Model 1. It cannot be concluded that piscivorous mammals are not at risk from abiotic exposure to U at Pit 3, Pit 4, the Blood Pool, and the Outfall (Table 40a).

Using Model 2, it cannot be concluded that piscivorous mammals are not at risk from U at Pit 3, Pit 4, the PCP, and the Blood Pool (Table 40a).

Total exposure Model 3 indicated that piscivorous mammals are at risk from exposure to Cd, Ni and U at Pit 3 and the PCP; Ni and U at the Blood Pool; and U at Pit 4 and the Outfall (Table 40a). It cannot be concluded that piscivorous mammals are not at risk from exposure to Ni at Pit 4 and Cd at the Blood Pool.

Using Model 4, piscivorous mammals are at risk from total exposure to U at Pit 3, Pit 4, the PCP, and the Blood Pool. It cannot be concluded that piscivorous mammals are not at risk from total exposure to Cd and Ni at Pit 3 and the PCP; and from exposure to U at the Outfall (Table 40a).

Potentially Impacted Area

Piscivorous mammals are at risk from abiotic exposure to U in the Central Drainage based on Model 1 (Table 40b). It cannot be concluded that piscivorous mammals are not at risk from abiotic exposure to Mn in Middle Blue Creek.

Using Model 2 exposure parameters, it cannot be concluded that piscivorous mammals are not at risk from exposure to U in the Central Drainage (Table 40b).

Model 3 indicated that piscivorous mammals are at risk from exposure to Cd, Ni and U in the Central Drainage, and from U in the Upper East Drainage. It cannot be concluded that piscivorous mammals are not at risk from exposure to Cd and U in the Western Drainage; Cd in the Upper East Drainage; and U in the Lower East Drainage and Upper, Middle and Lower Blue Creek (Table 40b).

Using Model 4, piscivorous mammals are at risk from total exposure to U in the Central Drainage. It cannot be concluded that piscivorous mammals are not at risk from exposure to U in the Western , Upper East, and Lower East Drainages; and Cd the Central Drainage (Table 40b).

6.9.2 Risk Characterization Summary for the Piscivorous Mammal Community

Uranium in soil and surface water drives risk predictions for piscivorous mammals in the MA and the Central Drainage (Table QH). Predicted concentrations of U in fish increase the predicted risk to piscivorous mammals in these areas. Piscivorous mammals are at risk from predicted concentrations of Cd and Ni in fish in the MA and the Central Drainage. Exposure to predicted concentrations of U in fish in the Western Drainage, the Upper and Lower Eastern Drainage, and Upper, Middle and Lower Blue Creek; and Cd in fish in the Western Drainage may also be of concern for piscivorous mammals (Table QH).

6.10 Assessment Endpoint #10: Viability and Function of the Soil Invertebrate Feeding Mammal Community

Dietary exposure concentrations for soil invertebrate feeding mammals were modeled using the masked shrew. Four exposure scenarios were modeled using input parameters in Table 18. Each exposure scenario was calculated for the MA and four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and from the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using literature-based BAF values for earthworms. Model 3 was calculated using the same parameters as Model 1 plus the maximum BAF value. Model 4 was calculated using the same parameters as Model 2 plus the maximum BAF value. Of the four models, Model 3 is the most conservative.

6.10.1 Risk to Soil Invertebrate Feeding Mammals in Terrestrial Ecosystems

Mined Area

Soil invertebrate feeding mammals in the MA are at risk from abiotic exposure to As, Mn, Mo, Se, U, and V based on Model 1. Cadmium, Cr, Pb, Tl and Zn may pose a risk in the MA.

Soil invertebrate feeding mammals are at risk from abiotic exposure to U based on Model 2 (Table 39A). Soil invertebrate feeding mammals may be at risk from abiotic exposure to Mo, Se, and V based on Model 2 results.

Based on total exposure Model 3, soil invertebrate feeding mammals in the MA are at risk from exposure to every COPC except Co. It cannot be concluded that soil invertebrate feeding mammals are not at risk from exposure to Co.

Using Model 4, soil invertebrate feeding mammals are at risk from exposure to As, Cd, Cr, Cu, Pb, Mo, Ni, Se, U, V, and Zn. It cannot be concluded that soil invertebrate feeding mammals are not at risk from total exposure to Mn and Tl in the MA.

Potentially Impacted Area

Soil invertebrate feeding mammals utilizing the PIAs are at risk from abiotic exposure to V in the Northeast and Southwest PIAs; As, U, and V in the East Haul Road PIA; and U and V in the West Haul Road PIA based on Model 1. It cannot be concluded that soil invertebrate feeding mammals are not at risk from abiotic exposure to As, Mo, Mn, Se, and U, depending on the AOI.

It cannot be concluded that soil invertebrate feeding mammals are not at risk from abiotic exposure to V in the Northeast and Southwest PIAs and U and V in the East and West Haul Road PIAs based on Model 2 (Table 39A).

Model 3 indicated that soil invertebrate feeding mammals are at risk from exposure to every COPC except Co depending on the PIA. It cannot be concluded that soil invertebrate feeding mammals are not at risk from total exposure to Co, Tl, and U depending on the PIA.

Using Model 4, soil invertebrate feeding mammals are at risk from exposure to As, Cd, Cr, Cu, Pb, Mo, Ni, Se, U, V, and Zn, depending on the PIA. It cannot be concluded that soil invertebrate feeding mammals are not at risk from total exposure to As, Mn, Mo, Tl, U, and V depending on the PIA.

6.10.2 Risk Characterization Summary for the Soil Invertebrate Feeding Mammal Community

Food chain models indicate risk to soil invertebrate feeding mammals particularly in the MA (Table QI). In the MA, soil and surface water metal concentrations contribute significantly to the predicted risk to soil invertebrate feeding mammals. In both the MA and the PIAs, inclusion of predicted metal concentrations in earthworms drives risk predictions (Table QI).

6.11 Assessment Endpoint #11: Viability and Function of the Insectivorous Avian Community

Dietary exposure concentrations for the insectivorous avian community were modeled using the cliff swallow. Four exposure scenarios were modeled using the input parameters in Table 19. Each exposure scenario was calculated for the MA and four AOIs in the PIA (the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road). For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using site-specific invertebrate tissue. Model 3 was calculated using the same parameters as Model 1 plus the maximum site-specific invertebrate tissue. Model 4 was calculated using the same parameters as Model 2 plus the maximum site-specific invertebrate tissue. Of the four models, Model 3 is the most conservative.

6.11.1 Risk to Insectivorous Birds in Terrestrial Ecosystems

<u>Mined Area</u>

Insectivorous birds are not at risk from abiotic exposure to COPCs in the MA using either Model 1 or Model 2 exposure parameters (Table 39b).

Total exposure Model 3 indicated insectivorous birds are at risk from exposure to Cu. Insectivorous birds may be at risk from total exposure to Cd, Cr, Pb, Se and Zn.

Using Model 4, insectivorous birds are at risk from exposure to Cu. It cannot be concluded that insectivorous birds are not at risk from exposure to Cd, Cr, Pb and Zn.

<u>Potentially Impacted Area</u>

Insectivorous birds are not at risk from abiotic exposure to COPCs in any PIA using either Model 1 or Model 2 exposure parameters (Table 39b).

Based on total exposure Model 3, insectivorous birds are at risk from Cu. Insectivorous birds may be at risk from total exposure to Cd, Cr, Pb, and Zn in all four PIAs.

Using Model 4, insectivorous birds are at risk from Cu. It cannot be concluded that insectivorous birds are not at risk from exposure to Cd, Cr, Pb, and Zn, depending on the PIA.

6.11.2 Risk Characterization Summary for the Insectivorous Avian Community

Models 1 and 2 indicated that soil and surface water are not posing risk to insectivorous birds in the MA or PIA (Table QJ). Hazard quotient calculations for total exposure from Models 3 and 4 indicate insectivorous birds are at risk from Cu in invertebrates at all MA and PIA areas. Cadmium, Cr, Pb, and Zn in invertebrate prey species may also be of concern (Table QJ).

6.12 Assessment Endpoint #12: Viability and Function of the Omnivorous Avian Community

Dietary exposure concentrations for the omnivorous avian community were modeled using the song sparrow and the mallard. Exposure scenarios were modeled using the life history input parameters in Table 19. Exposure scenarios for the song sparrow were calculated for the MA, the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using site-specific terrestrial plant and invertebrate tissue. Model 3 was calculated using the same parameters as Model 1 plus the maximum concentrations for both aboveground plant tissue and invertebrate tissue. Model 4 for the song sparrow was calculated using the same parameters as Model 2 plus the maximum concentration for both the aboveground plant tissue and invertebrate tissue. Of the four models, Model 3 is the most conservative.

Four exposure scenarios were calculated for the mallard utilizing the water bodies in the MA (Pit 3, Pit 4, PCP, Blood Pool, and Outfall Pond) and the aquatic AOIs in the PIA (Western, Central, Upper Eastern, and Lower Eastern Drainages, Blue Creek, and FDR Lake). Model 1 was calculated using the maximum metal concentrations in instream sediments and the surface water, and conservative life history parameters. Model 2 was calculated using central tendency metal concentrations in instream sediments and surface water, and representative life history parameters. Models 3 and 4 include food ingestion using site-specific aquatic plant and invertebrate tissue for the PIA only. No site-specific aquatic plant and invertebrate tissue for the MA was available. Model 3 was calculated using the same parameters as Model 1 plus incorporated the maximum concentrations for the aquatic plant and invertebrate tissue. Model 4 was calculated using the same parameters as Model 2 plus incorporated the maximum concentrations for the aquatic plant and invertebrate tissue. Of the four models, Model 3 is the most conservative.

6.12.1 Risk to Omnivorous Birds in Terrestrial Ecosystems

<u>Mined Area</u>

Omnivorous birds are at risk from abiotic exposure to Se using Model 1 (Table 39b). It cannot be concluded that omnivorous birds are not at risk from abiotic exposure to Cr.

There was no predicted risk to omnivorous birds from abiotic exposure using representative Model 2 (Table 39b).

Based on Model 3, omnivorous birds are at risk from Se (Table 39b). It cannot be concluded that omnivorous birds are not at risk from total exposure to Cr, Pb, and Zn.

Using Model 4, it cannot be concluded that omnivorous birds are not at risk from total exposure to Zn (Table 39b).

Potentially Impacted Area

Omnivorous birds are not at risk from abiotic exposure to COPCs in any PIA using either Model 1 or Model 2 (Table 39b).

It cannot be concluded that omnivorous birds are not at risk from total exposure to Zn in all four PIAs, using either Model 3 or Model 4.

6.12.2 Risk to Omnivorous Birds in Aquatic Ecosystems

Mined Area

Omnivorous birds are at risk from abiotic exposure to Cu at the PCP based on Model 1. It cannot be concluded that omnivorous birds are not at risk from abiotic exposure to Zn at Pit 3; Cd, Ni, U and Zn at the PCP; As at the Blood Pool; and As and Zn at the Outfall Pond (Table 40a).

Using Model 2, no risk to omnivorous birds is predicted (Table 40a).

Total exposure of omnivorous birds was not evaluated in the MA.

Potentially Impacted Area

Omnivorous birds are at risk from abiotic exposure to Se in the Lower Eastern Drainage based on Model 1 (Table 40B). It cannot be concluded that omnivorous birds are not at risk from abiotic exposure to Se, U, and Zn in the Central Drainage; Mn and Zn in the Lower Eastern Drainage; As, Mn, and Zn in Middle Blue Creek; and Zn in FDR Lake.

Using Model 2, no risk to omnivorous birds is predicted (Table 40b).

Based on total exposure Model 3, omnivorous birds are at risk from exposure to Se in the Lower East Drainage. It cannot be concluded that omnivorous birds are not at risk from As, Cd, Mn, Se, U, and Zn, depending on the PIA (Table 40b).

Using Model 4, it cannot be concluded that omnivorous birds are not at risk from total exposure to Mn and Zn in Middle and Lower Blue Creek, and FDR Lake (Table 40b).

6.12.3 Risk Characterization Summary for the Omnivorous Avian Community

Conservative exposure models which include only site-specific metal concentrations in soil and surface water indicate risk to omnivorous birds from Cu and Se in the MA, and from Se in the Lower Eastern Drainage (Table QK and QL). Maximum concentrations of As, Cr, and Zn in soil, surface water, and sediment may be of concern in the MA; and As, Mn, Se, U, and Zn may be of concern in the PIAs. Model 2 does not indicate risk to omnivorous birds.

Model 3 HQs indicate that omnivorous birds are at risk from exposure to Se in the MA, from Cd and Mn in Middle Blue Creek, and from Se in the Lower Eastern Drainage. Chromium, Pb, and Zn may be of concern in the MA; and As, Cd, Mn, Ni, Se, U and Zn may be of concern in the PIAs (Table QK and QL).

Model 4 indicated that Zn may be of concern at all of the MA and PIA areas, and Mn may be of concern in Middle Blue Creek (Table QK and QL).

6.13 Assessment Endpoint #13: Viability and Function of the Soil Invertebrate Feeding Avian Community

Dietary exposure concentrations for the soil invertebrate feeding avian community were modeled using the American robin and the Wilson's snipe. Exposure scenarios were modeled using input parameters in Table 19.

Each exposure scenario for the American robin was calculated for the MA and four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using literature-based BAF values for earthworms. Model 3 was calculated using the same parameters as Model 1 plus the maximum BAF value. Model 4 was calculated using the same parameters as Model 2 plus the maximum BAF value. Of the four models, Model 3 is the most conservative.

Exposure scenarios for the Wilson's snipe were calculated for the water bodies in the MA and the aquatic AOIs in the PIA. The AOIs in the MA include Pit 3, Pit 4, PCP, Blood Pool, and Outfall Pond. The AOIs in the PIA include the Western, Central, Upper Eastern, and Lower Eastern Drainages, Blue

Creek, and FDR Lake. Model 1 was calculated using the maximum concentrations of the instream sediments and riparian sediments separately along with the collocated surface water maximum concentrations and conservative life history parameters. Model 2 was calculated using central tendency concentrations of instream sediments and riparian sediments separately along with the collocated surface water central tendency concentrations and representative life history parameters. Models 3 and 4 include food ingestion using site-specific aquatic plant and invertebrate tissue for the PIA only. No site-specific aquatic plant and invertebrate tissue for the MA was available. Model 3 was calculated using the same parameters as Model 1 plus the maximum concentrations for the aquatic plant and invertebrate tissue. Model 4 was calculated using the same parameters as Model 2 plus the maximum concentrations for the aquatic plant and invertebrate tissue. Of the four models, Model 3 is the most conservative.

6.13.1 Risk to Soil Invertebrate Feeding Birds in Terrestrial Ecosystems

Mined Area

Soil invertebrate feeding birds are at risk from abiotic exposure to Se using Model 1 (Table 39b).

There was no predicted risk to soil invertebrate feeding birds from abiotic exposure using representative Model 2.

Based on total exposure Model 3, soil invertebrate feeding birds are at risk from As, Cd, Cr, Cu, Pb, Se, and Zn. It cannot be concluded that soil invertebrate feeding birds are not at risk from total exposure to Mo and Tl.

Using Model 4, soil invertebrate feeding birds are at risk from Cd, Cr, Pb, and Se; it cannot be concluded they are not at risk from total exposure to Zn.

Potentially Impacted Area

Soil invertebrate feeding birds are not at risk from abiotic exposure to COPCs in any PIA using either Model 1 or Model 2 (Table 39b).

Based on total exposure Model 3, soil invertebrate feeding birds are at risk from Cd, Cr, Cu, Pb, Se, and Zn, depending on the PIA (Table 39b). Soil invertebrate feeding birds may be at risk from total exposure to As in the Northeast PIA and the East Haul Road.

Using Model 4, soil invertebrate feeding birds are at risk from Cd, Cr, Pb, and Zn, depending on the PIA (Table 39b). It cannot be concluded that soil invertebrate feeding birds are not at risk from total exposure to Zn in the Northeast and East Haul Road, and from total exposure to Cd and Zn in the Southwest PIA.

6.13.2 Risk to Soil Invertebrate Feeding Birds in Aquatic Ecosystems

Mined Area

Soil invertebrate feeding birds are at risk from abiotic exposure to Cu and Ni at the PCP based on Model 1. It cannot be concluded that soil invertebrate feeding birds are not at risk from abiotic exposure to As and Zn at Pit 3; Cd, U, and Zn at the PCP; and As at the Blood Pool and the Outfall (Table 40a).

Using Model 2, it cannot be concluded that soil invertebrate feeding birds are not at risk from Zn at Pit 3 and the PCP (Table 40a).

Total exposure of soil invertebrate feeding birds was not evaluated in the MA.

<u>Potentially Impacted Area</u>

Soil invertebrate feeding birds are at risk from abiotic exposure to Se in the Lower East Drainage based on Model 1 (Table 40b). It cannot be concluded that soil invertebrate feeding birds are not at risk from abiotic exposure to As, Cd, Mn, Se, U, and Zn, depending on the PIA.

Using Model 2, it cannot be concluded that soil invertebrate feeding birds are not at risk from Zn in the Central Drainage and Se and Zn in the Lower East Drainage (Table 40b).

Total exposure of soil invertebrate feeding birds was not evaluated in the PIAs.

6.13.3 Risk to Soil Invertebrate Feeding Birds in Riparian Ecosystems

It cannot be concluded that soil invertebrate feeding birds are not at risk from abiotic exposure to U and Zn in the Central Drainage riparian area; Cd, Mn and Zn in the Lower East Drainage riparian area; and Zn in the Middle Blue Creek riparian area based on Model 1 (Table 41).

Using Model 2, it cannot be concluded that soil invertebrate feeding birds are not at risk from Zn in the Central and Lower East Drainage riparian areas (Table 41).

Based on total exposure Model 3, soil invertebrate feeding birds are at risk from Se in the Upper East Drainage riparian area, and from exposure to Cd and Se in the Lower East Drainage riparian area. It cannot be concluded that soil invertebrate feeding birds are not at risk from Cd, Mn, Se, U, and Zn, depending on the riparian area (Table 41).

Using Model 4, soil invertebrate feeding birds are at risk from Se in the Upper and Lower East Drainage riparian areas (Table 41). It cannot be concluded that soil invertebrate feeding birds are not at risk from Zn in the Western and Central Drainage riparian areas; Cd and Zn in the Upper East Drainage riparian area; Cd, Mn and Zn in the Lower East Drainage riparian area; and Mn and Zn in the Middle and Lower Blue Creek riparian areas.

6.13.4 Risk Characterization Summary for the Soil Invertebrate Feeding Avian Community

Model 1 indicated soil invertebrate feeding birds are at risk from exposure to Cu, Ni, and Se in the MA; and Se in the Lower Eastern Drainage (Tables QM and QN1). Arsenic, Cd, U, and Zn may be of concern in the MA; and As, Cd, Mn, Se, U and Zn may be of concern in the PIAs (Tables QM, QN1, and QN2).

Model 2 indicated Zn may be of concern in the MA and the PIAs.

Models 3 and 4 indicated that soil invertebrate feeding birds are at risk from measured (snipe) or predicted (robin) concentrations of metals in invertebrates, as well as from metal concentrations in soil, sediment, and surface water. Model 3 indicates soil invertebrate feeding birds are at risk from measured concentrations of Se and Cd in the riparian areas. Soil invertebrate feeding birds are at risk from predicted concentrations of As, Cd, Cr, Cu, Pb, Se and Zn in the MA, and from predicted concentrations of Cd, Cr, Cu, Pb, Se and Zn in the PIAs and riparian areas. Predicted concentrations of Mo and Tl may be of concern in the MA, and As may be of concern in the PIAs. Measured concentrations of Cd, Mn, Se, U and Zn may be of concern to soil invertebrate feeding birds in the riparian areas (Tables QM, QN1 and QN2).

Model 4 indicates soil invertebrate feeding birds are at risk from measured concentrations of Se in the riparian areas, from predicted concentrations of Cd, Cr, Pb, and Se in the MA, and from exposure to predicted concentrations of Cd, Cr, Pb, and Zn in the PIAs. Predicted concentrations of Zn may be of concern in the MA and Cd and Zn in the PIAs. Measured concentrations of Cd, Mn, and Zn may be of concern to soil invertebrate feeding birds in the riparian areas (Tables QM and QN2).

6.14 Assessment Endpoint #14: Viability and Function of the Carnivorous Avian Community

Dietary exposure concentrations for the carnivorous avian community were modeled using the great horned owl and the American kestrel. Four exposure scenarios were modeled using input parameters in Table 19.

Each exposure scenario was calculated for the MA and four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using literature-based BAF values for small mammals. Model 3 was calculated using the same parameters as Model 1 plus the maximum BAF value. Model 4 was calculated using the same parameters as Model 2 plus the maximum BAF value. Of the four models, Model 3 is the most conservative.

6.14.1 Risk to Carnivorous Birds in Terrestrial Ecosystems

Mined Area

Based on using conservative Model 1, carnivorous birds are at risk from abiotic exposure to Se. It cannot be concluded that carnivorous birds are not at risk to As, Cr, Pb, and Zn (Table 39b).

No risk to carnivorous birds from abiotic exposure is predicted when representative Model 2 is used (Table 39b).

Based on total exposure Model 3, carnivorous birds are at risk from exposure to Cd, Cr, Pb, Se, and Zn (Table 39b). It cannot be concluded that carnivorous birds are not at risk to As.

Using Model 4, it cannot be concluded that carnivorous birds are not at risk from total exposure to Cd, Pb, Se, and Zn (Table 39b).

Potentially Impacted Area

Carnivorous birds are not at risk from abiotic exposure to COPCs in any PIA using either Model 1 or Model 2 (Table 39b).

Based on total exposure Model 3, carnivorous birds are at risk from Cd in the Northeast, and East and West Haul Road PIAs (Table 39b). It cannot be concluded that carnivorous birds are not at risk from total exposure to Cd, Cr, Pb, and Zn, depending on the PIA.

Based on Model 4, it cannot be concluded carnivorous birds are not at risk from total exposure to Cd, Cr, and Zn in all four PIAs (Table 39b).

6.14.2 Risk Characterization Summary for the Carnivorous Avian Community

Models calculated using only site-specific metal concentrations in soil and surface water indicate risk to carnivorous birds from Se in the MA (Tables QO and QP). Exposure models calculated using predicted concentrations of metals in small mammal prey species cannot conclude carnivorous birds are not at risk from exposure to Cd, Cr, Pb, Se, and Zn in the MA. Cadmium, Cr, Pb and Zn may be of concern in the PIAs (Tables QO and QP).

6.15 Assessment Endpoint #15: Viability and Function of the Piscivorous Avian Community

Dietary exposure concentrations for the piscivorous avian community were modeled using the great blue heron and the bald eagle. Three exposure scenarios were modeled using input parameters in Table 19.

Exposure scenarios were calculated for the water bodies in the MA and the riparian/aquatic AOIs in the PIA. The AOIs in the MA include Pit 3, Pit 4, PCP, Blood Pool, and the Outfall Pond. The AOIs in the PIA include the Western, Central, Upper Eastern, and Lower Eastern Drainages, Blue Creek, and FDR Lake. Model 1 was calculated using the maximum concentrations of the instream sediments and the surface water and conservative life history parameters. Models 3 and 4 include food ingestion using literature-based BAF values for fish. Model 3 was calculated using the same parameters as Model 1 plus the maximum BAF values for fish. Model 4 was calculated using the same parameters as Model 2 plus the maximum BAF values for fish. Of the three models, Model 3 is the most conservative.

6.15.1 Risk to Piscivorous Birds in Aquatic Ecosystems

Mined Area

No risk to piscivorous birds is predicted when Model 1is used (Table 40a). Model 2 was not run.

Based on total exposure Model 3, it cannot be concluded that piscivorous birds are not at risk from exposure to U at Pit 3 and the PCP.

No risk to piscivorous birds is predicted when Model 4 is used (Table 40a).

Potentially Impacted Area

No risk to piscivorous birds is predicted at any PIA using any exposure scenario (Table 40b).

6.15.2 Risk Characterization Summary for the Piscivorous Avian Community

Hazard quotients calculated using only site-specific metals concentrations in sediment and surface water (Models 1 and 2) do not indicate risk to piscivorous birds utilizing the MA or the PIAs (Tables QQ and QR). The exposure models calculated using predicted COC concentrations in fish indicate piscivorous birds may be at risk from exposure to U in the MA.(Tables QQ and QR).

6.16 Assessment Endpoint #16: Viability and Function of the Herbivorous Avian Community

Dietary exposure concentrations for the herbivorous avian community were modeled using the Spruce grouse and the song sparrow. Four exposure scenarios were modeled using input parameters in Table 19.

Each exposure scenario was calculated for the MA and four AOIs in the PIA including the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road. For the MA, soil ingestion was collocated with water ingestion from Pit 3 and the PCP. For the Northeastern PIA, Southwestern PIA, East Haul Road, and West Haul Road, water ingestion was collocated with the Upper Eastern, Central, Upper Eastern, and the Western Drainages, respectively. Model 1 was calculated using maximum concentrations of soil and surface water and conservative life history parameters. Model 2 was calculated using central tendency concentrations of soil and surface water and representative life history parameters. Models 3 and 4 include food ingestion using site-specific terrestrial plant tissue. Model 3 was calculated using the same parameters as Model 1 plus the maximum concentration for the aboveground plant tissue. Model 4 was calculated using the same parameters as Model 2 plus the maximum concentration for the aboveground plant tissue. Of the four models, Model 3 is the most conservative.

6.16.1 Risk to Herbivorous Birds in Terrestrial Ecosystems

Mined Area

Herbivorous birds are at risk from abiotic exposure to Se; it cannot be concluded they are not at risk from abiotic exposure to Cr, using Model 1 (Table 39b).

No risk to herbivorous birds from abiotic exposure is predicted using Model 2 (Table 39b).

Based on total exposure Model 3, herbivorous birds are at risk from Se (Table 39b). It cannot be concluded herbivorous birds are not at risk from total exposure to Cr and Zn.

No risk to herbivorous birds is predicted when Model 4 is used (Table 39b).

Potentially Impacted Area

Herbivorous birds are not at risk from abiotic exposure to COPCs in any PIA using either Model 1 or Model 2 (Table 39b).

Based on total exposure Model 3, it cannot be concluded that herbivorous birds are not at risk from exposure to Zn in all four PIAs (Table 39b).

No risk to herbivorous birds is predicted when Model 4 is used (Table 39b).

6.16.2 Risk Characterization Summary for the Herbivorous Avian Community

Exposure models calculated using spruce grouse indicated that herbivorous birds are not at risk from exposure to site-related contaminants. Using the song sparrow and conservative exposure parameters, herbivorous birds are at risk from exposure to Se in the MA (Table QT). Models which incorporate site-specific metal concentrations in terrestrial vegetation indicate Cr, Pb, and Zn may pose a risk to herbivorous birds in the MA, and Zn may pose a risk in the PIAs (Tables QS and QT).

6.17 Assessment Endpoint #17: Viability and Function of the Amphibian Community

Measured concentrations of metals in surface water and sediment were compared to the amphibian TRVs (Table 17a). Only COPCs for which TRVs are available are included on the tables and in the discussion below. If a TRV was not available, no conclusions regarding risk were made.

6.17.1 Surface Water Exposure

Table 30 and the following discussion summarize the calculated risk for amphibians exposed to surface water at Pit 3, Pit 4, Central Drainage, Upper and Lower East Drainage, and Upper, Middle and Lower Blue Creek.

Pit 3: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Al, Cd, Cu, and Zn (Table 30). Amphibians are at risk from these COPCs.

Pit 4: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cu and Zn (Table 30). Amphibians are at risk from exposure to Cu and Zn. The NOAEL-based HQ exceeded 1.0 for Al, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Al at this location.

Central Drainage: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cd, Cu, and Zn (Table 30). Amphibians are at risk from exposure to Cd, Cu, and Zn. The NOAEL-based HQ exceeded 1.0 for Al, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Al.

Upper Eastern Drainage: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cu and Zn (Table 30). Amphibians are at risk from exposure to Cu and Zn. The NOAEL-based HQ exceeded 1.0 for Al and Cd, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Al or Cd.

Lower Eastern Drainage: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cu and Zn (Table 30). Amphibians are at risk from exposure to Cu and Zn. The NOAEL-based HQ exceeded 1.0 for Al and Cd, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Al or Cd.

Upper Blue Creek: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Al, Cu and Zn (Table 30). Amphibians are at risk from exposure to Al, Cu and Zn. The NOAEL-based HQ exceeded 1.0 for Cd, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Cd.

Middle Blue Creek: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Al, Cu, and Zn (Table 30). Amphibians are at risk from exposure to Al, Cu and Zn. The NOAEL-based HQ exceeded 1.0 for Cd, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Cd.

Lower Blue Creek: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Al, Cu and Zn (Table 30). Amphibians are at risk from exposure to Al, Cu and Zn. The NOAEL-based HQ exceeded 1.0 for Cd, but the LOAEL-based HQs were less than 1.0. It cannot be concluded there is no risk to amphibians from Cd.

6.17.2 Sediment Exposure

Table 31 and the following discussion summarize the calculated risk for amphibians exposed to sediments at Pit 3, Pit 4, Central Drainage, Upper and Lower Eastern Drainage, and Upper, Middle and Lower Blue Creek.

Pit 3: NOAEL-based HQs exceeded 1.0 for Cd and Zn, but the LOAEL-based HQs were less than 1.0. It cannot be concluded that there is no risk to amphibians from Cd or Zn (Table 31).

Pit 4: None of the calculated HQs exceeded 1.0 for Cd or Zn. Amphibians are not at risk (Table 31).

Central Drainage: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cd (Table 31). Amphibians are at risk from exposure to Cd. The NOAEL-based HQ exceeded 1.0 for Zn, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Zn.

Upper Eastern Drainage: The NOAEL-based HQ exceeded 1.0 for Cd, but the LOAEL-based HQ was less than 1.0 (Table 31). It cannot be concluded there is no risk to amphibians from Cd.

Lower Eastern Drainage: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cd (Table 31). Amphibians are at risk from exposure to Cd. The NOAEL-based HQ exceeded 1.0 for Zn, but the LOAEL-based HQ was less than 1.0. It cannot be concluded that there is no risk to amphibians from Zn.

Upper Blue Creek: The NOAEL-based HQ exceeded 1.0 for Cd, but the LOAEL-based HQ was less than 1.0 (Table 31). It cannot be concluded that there is no risk to amphibians from Cd.

Middle Blue Creek: Both the NOAEL and LOAEL-based HQs exceeded 1.0 for Cd (Table 31). Amphibians are at risk from Cd. The NOAEL-based HQ exceeded 1.0 for Zn, but the LOAEL-based HQ was less than 1.0. It cannot be concluded that there is no risk to amphibians from Zn.

Lower Blue Creek: The NOAEL-based HQ exceeded 1.0 for Cd, but the LOAEL-based HQ was less than 1.0. It cannot be concluded there is no risk to amphibians from Cd.

6.17.3 Dietary Exposure

Food chain exposure models were not run for amphibians, due to the lack of quantitative information on exposure routes (food, surface water, and soil ingestion rates) and lack of acceptable studies from which to derive TRVs for ingestion.

6.17.4 Risk Characterization Summary for the Amphibian Community

Copper and Zn in surface water posed a risk to amphibians at all of the AOIs (Table 30). It could not be concluded that there was no risk from Al and Cd at all of the AOI in the MA and PIA. Chromium and Pb did not pose a risk to amphibians at any of the AOIs.

Exposure to Cd in sediment posed a risk at Central and Lower Eastern Drainages and Middle Blue Creek. It cannot be concluded that there was no risk from Cd and Zn in sediments at Pit 3, from Zn at Central and Lower Eastern Drainages and Middle Blue Creek and from Cd at Upper Eastern Drainage and Upper and Lower Blue Creek (Table 31).

Risk to amphibians from Sb, As, Ba, Be, Co, Mn, Mo, Se, Ag, Tl, U, and V could not be evaluated due to lack of appropriate TRVs.

6.18 Assessment Endpoint #18: Viability and Function of the Wetland Plant Community

Measures of effects to wetland plants were evaluated by comparing the concentrations of metals in sediment to the BM values for terrestrial vascular plants presented in Table 3. Benchmark values were used because only a limited number of studies were found to evaluate the adverse effects of exposure to metals to wetland plants.

Risk was calculated for wetland plants exposed to sediment at two AOIs in the MA (Pit 3 and Pit 4) and at six AOIs in the PIA (Central Drainage, Upper Eastern Drainage, Lower Eastern Drainage, Upper Blue Creek, Middle Blue Creek, and Lower Blue Creek) (Tables 32 and 33). If the concentration of a COPC exceeded the BM (Table 3), wetland plants were considered to be at risk.

<u>Pit 3:</u> HQs exceeded or were equal to 1.0 for As, Ba, Cr, Co, Cu, Mn, Ni, U, V, and Zn.

<u>Pit 4:</u> HQs exceeded 1.0 for As, Cr, Co, Mn, Ni, Tl, U, V, and Zn.

<u>Central Drainage:</u> HQs exceeded 1.0 for As, Cr, Co, Mn, Ni, Se, U, V, and Zn.

<u>Upper East Drainage:</u> HQs exceeded 1.0 for As, Cr, Co, Mn, Ni, U, V, and Zn.

<u>Lower East Drainage:</u> HQs exceeded 1.0 for As, Cd, Cr, Co, Mn, Ni, Se, U, V, and Zn.

<u>Upper Blue Creek:</u> HQs exceeded 1.0 for Cr, Mn, Ni, Se, U, and V.

Middle Blue Creek: HQs exceeded 1.0 for As, Ba, Cd, Cr, Co, Mn, Ni, Se, U, V, and Zn.

Lower Blue Creek: HQs exceeded 1.0 for As, Cr, Mn, Ni, U, V, and Zn.

6.18.1 Risk Characterization Summary for the Wetland Plant Community

Chromium, Mn, Ni, U, and V exceeded plant BM values at all of the AOIs (Tables 32 and 33). Arsenic, Ba, Cd, Co, Se, and Zn exceeded plant BM values at some locations. Two COPCs exceeded the BM values at only one location: Cu, in Pit 3; and Tl, in Pit 4.

6.19 Assessment Endpoint #19: Viability and Function of the Wetland Invertebrate Community

Measures of effects to wetland invertebrates were evaluated by comparing the concentrations of metals in sediment to the sediment BM values that were selected for the SLERA (see Section 2.3.2.1.2 and Table 2). Risk was calculated for wetland invertebrates exposed to sediment at two AOIs in the MA (Pit 3 and Pit 4) and at six AOIs in the PIA (Central, Upper Eastern, and Lower Eastern Drainages, Upper Blue Creek, Middle Blue Creek, and Lower Blue Creek (Tables 34 and 35). If the concentration of a COPC exceeded the sediment BM, wetland invertebrates were considered to be at risk.

Pit 3: HQs exceeded 1.0 for Sb, As, Ba, Be, Co, Cu, Mn, Ni, Se, U, and Zn.

Pit 4: HQs exceeded 1.0 for Sb, As, Be, Co, Mn, Ni, Se, and U.

Central Drainage: HQs exceeded 1.0 for Sb, As, Be, Cd, Co, Mn, Ni, Se, U, and Zn.

Upper Eastern Drainage: HQs exceeded 1.0 for Sb, As, Be, Co, Mn, Ni, Se, Ag, and U.

Lower Eastern Drainage: HQs exceeded 1.0 for Sb, As, Be, Cd, Co, Mn, Ni, Se, U, and Zn.

Upper Blue Creek: HQs exceeded 1.0 for Sb, Cd, Mn, Ni, Se, and U.

Middle Blue Creek: HQs exceeded 1.0 for Sb, As, Ba, Be, Cd, Co, Mn, Ni, Se, U, and Zn.

Lower Blue Creek: HQs exceeded 1.0 for Sb, As, Be, Cd, Mn, Ni, Se, U, and Zn.

6.19.1 Risk Characterization Summary for the Wetland Invertebrate Community

Measured concentrations of Sb, Mn, Ni, Se, and U exceeded sediment invertebrate BM values at all of the AOIs in the MA and PIA (Tables 34 and 35). Arsenic, Ba, Be, Cd, Co, and Zn exceeded sediment invertebrate BM at some locations. Two COPCs exceeded the sediment BM at only one location: Cu, in Pit 3; and Ag, in the Upper Eastern Drainage.

6.20 Assessment Endpoint # 20: Observable Reductions of Survival and Reproductive Capability in Aquatic Animal Populations Related to Total Ionizing Radiation Exposure

Radium 226, ^{228}Ra, ^{232}Th, ^{234}U, ^{235}U, and ^{236}U were measured in surface waters and instream sediments in the MA and PIA. AOI-specific screening was conducted by using the sum-of-the fractions approach to compare the central tendency concentrations of each radionuclide with the default BCG of that radionuclide for each environmental medium.

The sum-of-the-fractions process was used to calculate TIR exposure to aquatic systems based on composite instream sediments plus surface water and grab instream sediments plus surface water. Tables S-1 to S-11 (Appendix S) present the calculations for the composite sediments plus water for each AOI and Tables S-12 to S-25 present the calculations for the grab sediments plus water for each AOI. Table 36 summarizes the results of the TIR exposure for both the composite instream sediments plus surface water and instream grab sediments plus surface water based on central tendency concentrations.

6.20.1 Risk Characterization Summary for Assessment Endpoint # 20

Pit 3, Pit 4, the PCP, and Blood Pool exceeded the TIR criterion of 1 rad/day for the protection of aquatic animals (Table 36). Surface water TIR exposures drive the risk with elevated TIR at each of these AOIs. Only the Outfall Pond had TIR of less than 1 rad/day.

The Central and Northeastern Drainages exceeded 1 rad/day. Surface water TIR drives the risk with elevated TIR at these two AOIs. The Western, Upper Eastern, and Lower Eastern Drainages, Upper Blue Creek, Middle Blue Creek, Lower Blue Creek, and FDR Lake, had TIR less than 1 rad/day, indicating no TIR risk to aquatic animals (Table 36).

6.21 Assessment Endpoint # 21: Observable Reductions of Survival and Reproductive Capability in Riparian Animal Populations Related to Total Ionizing Radiation Exposure

Radium 226, ^{226}Ra, ^{228}Ra, ^{232}Th, ^{234}U, ^{235}U, and ^{236}U were measured in surface waters and riparian sediments for six AOIs in the PIA. AOI-specific screening was conducted by using the sum-of-the fractions approach to compare the central tendency concentrations of each radionuclide with the default BCG for each environmental medium.

The sum-of-the-fractions process was used to calculate TIR exposure to riparian systems based on riparian sediments plus surface water. Tables S-26 to S-31 (Appendix S) present calculations for the riparian sediments plus water for each AOI. Table 37 summarizes the TIR exposures.

6.21.1 Risk Characterization Summary for Assessment Endpoint #21

The Central, Western, and Lower Eastern Drainages exceeded the TIR criterion of 1 rad/day for the protection of riparian animals. The Upper Eastern Drainage, Lower Eastern Drainage, Middle Blue Creek, and Lower Blue Creek, had TIR of less than 1 rad/day indicating no TIR risk to riparian animals (Table 37).

6.22 Assessment Endpoint # 22: Observable Reductions of Survival and Productivity and/or Reproductive Capability in Terrestrial Plant and Animal Populations Related to Total Ionizing Radiation Exposure

Radium 226, ^{226}Ra, ^{228}Ra, ^{232}Th, ^{234}U, ^{235}U, and ^{236}U were measured in soils (surface and subsurface) and surface waters in the MA and PIA. Location (AOI) specific screening was conducted for each radionuclide with the default BCG for each environmental medium.

The sum-of-the-fractions process was used to calculate TIR exposure for surface soils and surface water and for subsurface soils and surface water. Tables S-32 to S-37 (Appendix S) present the calculations for the surface soils plus surface water for each AOI and Tables S-38 to S-42 present the calculations for the subsurface soils plus surface water for each AOI. Table 38 summarizes the results of TIR exposure for both types of sampling.

6.22.1 Risk Characterization Summary for Assessment Endpoint #22

All AOIs in the MA and PIA had TIR exposures of less than 1 rad/day indicating no ionizing radiation risk to terrestrial plant and animal populations (Table 38).

6.23 Overall Characterization of Risk from Ionizing Radiation (Assessment Endpoints #20, 21, and 22)

Overall, the risks associated with TIR are found in the MA, and in the Central, Western, Northeastern, and Lower Eastern Drainages. There is uncertainty associated with the animal exposure screening, because one potentially significant contributor to wildlife exposure that was not included in this study was the mineral salt deposits found around the perimeter of water bodies in the MA. Further study is needed to better characterize the chemical and radiological aspects of these salt deposits, and their ingestion by wildlife.

7.0 UNCERTAINTY ANALYSIS

Uncertainties and limitations are inherent in all risk assessments and need to be considered when interpreting results. Knowledge of the sources of uncertainty, how the ERA dealt with the sources of uncertainty, and an understanding on the magnitude of the effects resulting from the sources of uncertainty allows for informed management decisions. The nature and magnitude of uncertainties depend on the amount and quality of data available, the degree of knowledge concerning the site conditions, and the assumptions made to perform the assessment. Throughout this ERA the words "may" or "could" are used to denote and acknowledge the uncertainties, limitations, and assumptions that are used in evaluating risk and developing this ERA. Within this ERA, decisions regarding the direction of uncertainty were made to err towards the conservative side; however, there are some instances for which insufficient information was available to estimate the direction of the uncertainty. The uncertainties related to problem formulation, exposure characterization, effects characterization, and risk characterization are discussed in the following sections.

7.1 Problem Formulation

There are several sources of uncertainty within the problem formulation phase of the ERA. These include: issues related to the compilation of existing data and how this data may be used within the ERA; the selection of assessment endpoints; and, assumptions within the site conceptual model.

The uncertainties and limitations associated with the data limitations include the use of the historical database and the availability of data used for characterizing risk. An electronic database pooled the environmental media sampling from site investigations conducted by Ecology & Environment during 1998 (E&E 1998), by SMI during 1999 (SMI 1999a), and by URS Corporation from 1999 to 2001 (URS 2000a, 2001a, 2001b). Appendices D through H summarize the sampling populations for each area of interest (AOI) for the surface water, instream sediments, riparian sediments, and soils. The sizes of the sampling populations vary between type of media and between AOI. Most of the sample populations had sample sizes of less than 20 with several populations containing only one or a few data points. The availability of data, particularly for some AOIs, may not accurately reflect the contaminant exposure for that area. However, since maximum and/or high end exposure estimate parameters were used, the likelihood of underestimating actual exposures is believed to be low. Maximum concentrations of contaminants in soil, water, sediment, and tissue were used for defining exposure throughout the ERA except where central tendency values were specifically evaluated for the purpose of comparison.

Another issue related to data use is how the ERA utilized non-detect data. For this ERA when a COPC was not detected in a particular sample, it was assumed that the actual concentration of that COPC in that sample was one-half the detection limit. Therefore, even if a particular COPC was not detected in any of the samples for a particular matrix, data for that contaminant in that matrix were still evaluated in this risk assessment for estimating exposure by assuming that the contaminant was actually present at one-half of the detection limit for that particular contaminant in that particular matrix.

The selection of appropriate assessment endpoints and the receptors that will serve to characterize risk of the assessment endpoints is a critical step within the problem formulation of an ERA. If a particular assessment endpoint or the receptor that may potentially be exposed to site contaminants is overlooked or not identified, there will be an underestimation of risk. Within this ERA, the selection of assessment endpoints and the respective receptors was performed with the intent of being inclusive for this site. However, given the complexity of the environment and the state of our knowledge of organism interactions, it is always possible that a unique exposure pathway or receptor exists that was not acknowledged within the problem formulation.

The site conceptual model presents the pathways by which contaminants are released from source areas and expose receptors. However, some exposure pathways are difficult to evaluate or information does not exist to allow for a quantitative evaluation of exposure from particular exposure pathways. Within this ERA there are several exposure pathways to ecological receptors which could not be addressed. These include dermal exposure, inhalation exposure, and the ingestion of salt deposits potentially contaminated with COPCs around the perimeter of the lacustrine habitats within the MA by wildlife. These are discussed more fully below, however, it is believed that the dermal and inhalation exposure pathways are not substantive relative to other exposure pathways. Data were not available to allow the development of a quantitative exposure assessment for the ingestion of salt deposits; therefore, this component of the exposure could not be quantitatively incorporated into the risk characterization.

Sampling of aquatic plants and invertebrates, riparian plants and invertebrates, and terrestrial plants and invertebrates was performed to estimate the bioaccumulation of metals (SMI 1999b, 1999c) as described in Section 4.2.3. Sampling was only performed over a single sampling period in September and October 1998 that involved composite sampling of the biota. The aboveground plant tissue samples were a composite sampling of tissue that was harvested plus litter present within each sampling plot. The terrestrial, riparian, and aquatic invertebrate samples were also composite samples of invertebrates collected and, subsequently, does not reflect specific diet preferences of consumers nor reflect bioaccumulation potential of specific invertebrates. When samples did not have sufficient biomass, elemental U analysis was substituted for U isotopic analysis to estimate total U from the specific activity of the radioisotopes as described in Section 4.2.3.3. It was assumed that this data is representative of the bioaccumulation at each area and therefore appropriate for use in the exposure assessment. Data limitations related to variations in tissue concentrations due to seasonal changes, between species bioaccumulation, and specific exposure/bioaccumulation relationships could not be evaluated. The direction of the uncertainty due to these data limitations can not be conclusively stated; however, since maximum values were preferentially used within the exposure estimates for each AOI, it is believe that the likelihood of substantive underestimation of exposure is not high.

7.2 Exposure Characterization

The uncertainties associated with exposure characterization include: the total exposure estimations inclusive of the background levels; exposure pathways not retained for quantitative evaluation; identification of ecological receptors; selection of representative species; exposure route assumptions; and speciation of metals.

Total exposure for estimating risk of the metals and radionuclides in the surface water, sediments and soils for each assessment endpoint using maximum and central tendency values was inclusive of natural background levels and background was not subtracted from the total measured concentrations of the environmental media. Total exposure that is inclusive of natural background levels presents the total risk estimate rather than only the increase in risk resulting from Site contaminant releases. Further, by itself, total risk does not indicate whether or not Site releases substantively increased the risk.

The methods (U.S. DOE 2002) for evaluating radiation doses to aquatic and terrestrial biota are intended to be conservative in their approach to estimate dose rates per unit concentration of radionuclides in water, sediments, or soils. The daily dose limits for biota (or the biota concentration guides [BCG]) are intended to provide protection of whole populations of individual species rather than individual members of a population that might experience a greater dose. Both maximum and central tendency concentrations of the radionuclides that were compared to the BCG values were used for estimating exposure in this ERA. The maximum concentrations of the radionuclides used for assessing risk in the screening level ecological risk assessment (SLERA) (Section 2.4.1.5) provided a means of estimating exposure towards the upper end of the range of measured values, but there is the probability that additional sampling could indicate that higher exposures may occur. For this reason, it is possible that ionizing radiation exposure may be greater than that calculated. However, it is believed that these circumstances would not be prevalent within any given AOI and that the magnitude of the increased exposure would not be dramatically different from the upper maximum values measured for that area. It should also be noted that the evaluation of exposure to total ionizing radiation (TIR) was inclusive of natural background levels. For the baseline ecological risk assessment (BERA), central tendency concentrations of the radionuclides were used for the risk calculations based on the premise that the area of habitation for many individual members of a population will utilize home ranges considerably greater than a particular AOI. Since each AOI was evaluated individually, it is not expected that the calculations for TIR exposure would be underestimated based on individual AOIs with the exception of the MA. Ionizing radiation exposure to specific receptors that may utilize the MA may possibly be underestimated for exposure based on the central tendency calculations.

The measurable attributes in this ERA that incorporated the use of dietary models followed a common practice to develop the exposure models using a surrogate or receptor species as the model. For these models life history information of each receptor species was gathered to define the exposure parameters for the model. There is uncertainty with the data available on individual species for these parameters due to a lack of specific knowledge. Additionally, an element of uncertainty is introduced by the selection of receptor model species which represent the assessment endpoints. Within this ERA, the selection of receptor model species was done with the intent of selecting species models which would result in the use of conservative model parameters relative to the array of organisms represented by the assessment endpoint. For example, a bobcat model was used for the assessment of risk to carnivorous mammals instead of the lynx which is also within the area of the Midnite Mine Site. The lynx, which has a larger home range and a larger body size, would result in a lower exposure and thereby a lower calculated modeled risk for that assessment endpoint. The uncertainty associated with the selection of species models is often in the direction of over estimation of risk for most species included within the assessment endpoint; however, it is possible that a species or individual organisms could have higher exposures that those calculated within this ERA.

Life history data for the avian and mammalian receptors were based primarily on literature derived data for species known to inhabit or utilize the region of this study area. However, the exposure parameters were either based on data from the same species from different areas or modeled based on allometric relationships (e.g., food ingestion rates). Uncertainty associated with variability is introduced from the use of literature-based values for soil, sediment, water, and food ingestion rates, dietary compositions, and body weights. These values may be from studies conducted at a time of year or location that does not necessarily give an accurate representation of the life histories of the receptor species in the Midnite Mine area. Allometric equations are often derived using data from a variety of different taxa; values calculated using such equations may not be representative of a particular species.

No adjustments were made to the receptor life history parameters to account for regional factors. Only information for adult organisms was used, with no gender differentiation. In instances where more than one data set was combined to derive an average, each data set was assumed to be equally weighted. Certain assumptions were made relating to several exposure parameters that deviated from the information developed within the life history profiles. For the area use factor (AUF), which is the foraging area utilized by the receptor for the exposure model, a factor of 1.0 was applied. An AUF of 1.0 assumes that100% of the exposure occurs at the exposure point concentration. For these high-end exposure scenarios, the exposure value for each contaminant used in the risk calculations was assumed to be present throughout the foraging area of the receptor and encountered at the predicted concentration and does not incorporate the seasonal movement patterns of some species.The AUF of 1.0 being applied to each AOI should overestimate the actual risk to the receptors.

Another assumption is that the contaminants in food items were assumed to exhibit 100 percent (%) absorption efficiency and were assumed not to be excreted during the life of the receptor. That is, the risk estimated from dietary exposure is based on administered dose not adsorbed dose. Dietary ingestion information was obtained from the literature for the receptor species. However, simplifications of complex diets were performed to utilize site specific tissue, sediment, and water data. In some cases, water and/or food ingestion rates were based on information for a similar species or calculated from an allometric equation. It was assumed that these estimated ingestion rates were representative of the true ingestion rates for the receptor species in question.

Modeling the dietary component of the avian or mammalian receptors either utilized maximum contaminant levels in the vegetative and invertebrate tissue or bioaccumulation factors (BAF) derived from the literature for earthworms, small mammals, and fish. The uncertainty related to the tissue data was previously described in Section 7.1. Bioaccumulation factors for small mammals, earthworms, and fish were derived from the literature as described in Section 4.3.5 Only maximum BAF values were applied to the modeling and would more than likely overestimate risk, particularly for carnivorous mammals and birds, piscivorous mammals, and soil-invertebrate feeding mammals and birds. Available bioaccumulation information from the literature for fish tissue was limited to three metals (U, Ni, and Cd) preventing an assessment of risk based on the dietary component from other COPCs to the piscivorous mammals and birds.

There is very little information available in the literature regarding the rates of incidental soil/sediment ingestion for wildlife species. In this ERA, with the exception of the meadow vole, white-tailed deer, muskrat, raccoon, and mallard duck, soil/sediment ingestion rates were based on estimates reported for species similar to the indicator species, not for the receptor itself. For the muskrat, measures of soil ingestion *per se* were not available; instead, the percentage of stomach contents not identified as consisting of either plant or animal material was used to represent soil intake. Soil ingestion rates for mink, Wilson's snipe, American kestrel, great horned owl, great blue heron, and bald eagle were estimated as the amount of soil entrained in the digestive tract of prey species. The uncertainty related to incidental soil/sediment ingestion could either underestimate or overestimate the exposure depending upon the species. Some species do not always consume the prey whole while others do. In addition, there may be other pathways for sediment or soil ingestion not accounted for within the exposure models used. The food chain models used simplified diets of one or two items with a static ingestion rate; in reality, each receptor organism's diet is varied, and the ingestion rate varies with food availability and metabolic needs (such as during growth of young and periods of metabolic stress). While reliance on a single forage item is not realistic over long time periods or even a growing season, it may not be implausible within the time frame relevant to the toxic mechanism of the contaminants. Organisms do not use the environment uniformly, but rather forage where food is most readily available to them. Also, organisms may focus on particular food items as they become available, such as when insects are emerging or when a particular berry is ripe. For this reason, the use of a single or limited number of food items, which were selected such that potential for under-estimating exposures is believed to be low, may not dramatically over-estimate exposure but also should not under-estimate actual exposures within relevant time frames.

The mineral salt deposits visible around the perimeter of the water bodies in the MA were not analyzed for chemical or radiological properties, and were not included in the food ingestion exposure models. These salt deposits may be a potentially significant contributor to the total daily dose of COPCs and TIR to which animals are exposed. However, there is a lack of information available to conduct a credible estimation of the additional exposure which occurs from this exposure pathway. Therefore, this uncertainty is acknowledged but is incorporated into the risk characterization in only a qualitative way.

Exposure pathways selected for modeling did not examine the contribution of dermal absorption by birds or mammals or inhalation exposure of particulates. These exposure pathways were not incorporated into the ERA as neither site-specific data or literature parameters are readily available which would allow a credible estimation of the exposure and risk. In contrast to the use of conservative assumptions, the error introduced into this risk assessment by the omission of these routes of exposure may result in a less protective outcome. The relative degree to which this error alters the outcome of the ERA is unknown; however, if these exposure pathways do substantively contribute to the ecological risk, it is anticipated that they would be similar in areal distribution to the other risks estimated. Therefore, it is believed that the risk conclusions for the AOIs presented in this ERA would not be substantively changed by the inclusion of these exposure pathways.

Information concerning speciation of metals was generally lacking. It is widely recognized that bioavailability and toxicity can vary dramatically as a function of the metal species. As consequence, exposure and risks may be either underestimated or overestimated. However, given that the Site area did not refine or process the ore material and that the toxicological studies used to generate the TRVs for this ERA generally used bioavailable/toxic forms of the contaminants, it is unlikely that risk is substantively underestimated.

7.3 Effects Characterization

Benchmark (BM) values selected for surface water, sediments, and soils were derived (See Section 2.3.2.1) from the most current criteria, guidance, or technical data available and were based on the more conservative value of the available published literature that would not pose an adverse effect. In addition, BMs for the hardness-dependent metals - Cd, Cu, Pb, Ni, and Zn - were based on dissolved metal concentrations at a water hardness of 30 mg/L as $CaCo_3$. Since water hardness levels are significantly above the 30 mg/L at most of the aquatic AOIs with the exception of the Upper Blue Creek, the BMs for the hardness dependent metals would likely overestimate risk for much of the year.

Not all toxicity reference values (TRV) for amphibians, birds, or mammals (Appendices J and K) represent the same degree of certainty. Toxicity reference values were mostly derived from laboratory animal studies. The extrapolation between species from different taxa may induce error because of differences in pharmacokinetics, representative organs, and population variability. For the amphibians and some individual elements the toxicity database was limited or not avialable. Toxicity reference values were selected through a systematic process to minimize the potential for under-estimating the toxicity of contaminants to the assessment endpoints.

A literature search was conducted to determine the chronic toxicity of the contaminants of concern when ingested by the indicator species. If no toxicity values could be located for the receptor species, values reported for a closely related species were used. All studies were critically reviewed to determine whether study design and methods were appropriate. When values for chronic toxicity were not available, LD_{50} (median lethal dose) values were used. For the purposes of this ERA, a factor of 10 was used to convert the reported LD_{50} to a LOAEL. A factor of 10 was also used to convert a reported LOAEL to a NOAEL. If the only information available in the literature was a NOAEL, a factor of 10 was used to convert it to a LOAEL. When several toxicity values were reported for a receptor species, the most conservative value that resulted in an ecologically significant adverse effect was used in the risk calculations, regardless of toxic mechanism. Toxicity values obtained from long-term feeding studies were used in preference to those obtained from single dose oral studies. No other safety factors were incorporated into this ERA.

The utilization of a conversion factor of 10 is an accepted practice for converting BM values (Dourson and Stara 1983, Sample *et. al*.1995, Suter and Taso 1996). This conversion factor of 10 is commonly utilized when the actual relationship between the BMs is known even when it is known that the factors are less than 10. Therefore, it is believed that the use of a conversion factor of 10 for converting toxicity BMs is conservative and does not under-estimate the risks calculated.

Uncertainty related to the toxicity estimates of effects including NOAELs, LOAELs, LD_{50}s, and other mathematical calculations derived from the literature have inherent variability. These values are statistically determined and are reflective of the experimental design. For example, within a particular toxicity study the reported LOAEL and/or NOAEL is dependent upon the exposure levels selected within the study design. It is not known within these studies how much lower the LOAEL may be or how much higher the NOAEL may be. However, within the risk calculations this error is believed to be relatively minor as compared to other sources of error within the risk calculations of the ERA.

In some cases, contaminant doses in the diet were reported as parts per million (ppm). These were converted to a daily intake in milligrams per kilogram body weight BW per day (mg/kg BW/day) by using the formula:

$$\text{Daily Intake (mg/kg/day)} = \text{Contaminant Dose (mg/kg diet)} \times \text{Ingestion Rate (kg/day)} \times 1/\text{Bodyweight (kg)}$$

This conversion allows dietary toxicity levels cited for one species to be converted to a daily dose for a different species based on body weight. Incidental sediment ingestion was also included in the daily dose calculation. This daily dose may then be used to evaluate the risk to other species, if no specific toxicity data is available for a target receptor.
Error can be introduced by use of invalid assumptions in the conceptual model. Conservative assumptions were made in light of the uncertainty associated with the risk assessment process. This was done to minimize the possibility of concluding that no risk is present when a threat actually does exist (i.e., to eliminate false negatives). Whenever possible, risk calculations were based on conservative values. For example, NOAELs used to calculate HQs were the lowest values found in the literature, regardless of toxic mechanism.

Risk estimates were determined for each COPC individually. Hazard indices (HI), which are the summation of HQs, were not calculated in this ERA. It is the general practice within risk assessments to use HI calculations when it is known that several contaminants interact. The interaction between contaminants may be additive, antagonistic or synergistic. Within the list of COPCs for this site only two contaminants (U and Cd) were identified as having the same mechanism of toxicity. Neither of these contaminants were eliminated as COPCs through the risk calculations, therefore the calculation of the HI results in a redundant conclusion of risk posed by both contaminants. There is also the potential of cumulative stress from the exposure to multiple stressors; however, this was not evaluated within this ERA. There is not an accepted practice for conducting this type of assessment and, furthermore, it is believed that HI assessments would not change the conclusions of this ERA.

Within this ERA it is assumed that cancer risk is not a substantive component of ecological risk. The risks posed by radiation is evaluated as the effect of TIR and not exposure to individual radioisotopes. It is believed that the toxicological risk posed by the individual elements greatly exceeds any risk posed by the radiological characteristics of the isotopes present. This may be viewed as an uncertainty which underestimates the risks posed by the Site, but it is believed to not substantively effect the risk based conclusions.

An antagonism between Mo and Cu to ruminants (e.g., deer, elk, sheep) from a dietary intake of sulfate (SO_4-S) that could cause copper deficiency is a potential risk. The high levels of SO_4 in the surface waters of the aquatic systems, particularly within the MA, could potentiate the toxic effect of Mo in ruminants. When ruminants ingest SO_4, there is a microbial reduction of SO_4-S and S-amino acids to sulfide and hydrogen sulfide ions that progressively displaces oxygen from ingested MoO_4 ions to yield oxthio and tetrathio molybdates which bind with Cu compounds making Cu physiologically unavailable (Mertz 1987, Mortvedt *et.al.*,1991). These documented effects are based on exposure to naive populations. The risk related to this dietary intake by a wildlife population is unknown at the Midnite Mine site.

7.4 Risk Characterization

This ERA evaluates exposure to contaminants through food, water, soil or sediment ingestion and/or uptake. Major sources of uncertainty include natural variability, error, and insufficient knowledge. Natural variability is an inherent characteristic of ecological receptors, their stressors, and their combined behavior in the environment. Biotic and abiotic parameters in these systems may vary to such a degree that the exposure of similar ecological receptors in the same system may differ temporally and spatially. Factors that contribute to temporal and spatial variability include differences in individual organism behavior (within a species), changes in the weather or ambient temperature, unanticipated interference from other stressors, interactions with other species in the community, differences between microenvironments, and numerous other factors.

An HQ equal to or greater than 1.0 indicates there is insufficient information to conclude negligible risk from exposure to contaminant at concentrations measured on-site. A HQ less than 1.0 may not indicate a lack of risk, but suggests that there is a high degree of confidence that minimal risk exists for the given contaminant, since BM values are based on the lowest measured concentration considered to be protective of the most sensitive organism in a medium.

Risk to the mammalian and avian assessment endpoints were evaluated from food chain modeling that incorporated exposure to contaminants through food, water, and incidental soil or sediment ingestion. Four food chain models were run. Model 1 used conservative life history parameters (lowest body weight and highest ingestion rates of soil or sediment and water) and the maximum concentrations of COPCs. Food intake was excluded for this model. Model 2 used representative life history parameters (average body weight and ingestion rates) and central tendency (mean or median) concentrations of contaminants. Food intake was excluded for this model also. Model 3 used the same conservative life history parameters and COPC concentrations as Model 1, along with the highest published ingestion rates for food. Model 3 was generally the most conservative of the models. Food exposure was based on either the maximum site-specific tissue data or on conservative literature-based BAFs. Model 4 used the same representative life history parameters as Model 2, along with the average (or mid-point of a published range) ingestion rates for food. Concentrations of COPCs in food were based on either the maximum site-specific tissue data or conservative literature-based BAFs. Both Models 1 and 3 with the more conservative inputs of the life history parameters along with the maximum environmental media values would reduce the chance that risk to the assessment endpoints would be underestimated.

The selection of representative species for the avian and mammalian assessment endpoints for characterizing risks was based on the species-specific intake parameters for the representative species. Other species present may have different exposure or intake parameters than that modeled for the representative species, which may be more or less sensitive to COPCs.

In general, data were reported to one or two decimal places. However, values obtained from the literature were used as reported in the citation. Where averages were calculated, the calculated value was retained. In the food chain models, the full value of calculations were retained. This was done to minimize rounding errors which may have added additional uncertainty, and does not imply additional precision. Hazard quotient (HQ) calculations were rounded and shown to two decimal places when less than 10.0, to on decimal place when between 10.0 and 100, and to zero decimal places when greater than or equal to 100. Thus, a calculated HQ of 0.995 will be presented as 1.00.

Uncertainty factors were not applied to the risk calculations within this ERA. As discussed above, conversion factors were used to convert toxicity benchmarks, however, uncertainty factors were not applied to any calculation including the development of a TRV or estimation of exposure. The approach taken in this ERA was to systematically use conservative assumptions and decisions to minimize the potential for underestimating exposure and risk. While the use of uncertainty factors could reduce the possibility of underestimating risk, it could potentially drive the acceptable exposure level for at least some elements below a level which is essential for the health of an organism. This reduction of an acceptable exposure level could result in nutritional deficiencies that subsequently could cause adverse effects due to lack of exposure. However, for this ERA any contaminants for which a case could be made for applying uncertainty factor to offset a potential nutrient deficiency would not substantively alter the conclusions of the ERA.

8.0 SUMMARY OF RESULTS

This ERA was conducted following Superfund guidance utilizing a systematic approach for selecting hazard and exposure parameters. This systematic approach incorporated the selection of conservative inputs for the risk calculations to reduce the chance that risk to the assessment endpoints should not be underestimated. An overview of some of the primary conservative inputs are:

• Highly conservative screening-level benchmark (BM) values for surface water, sediments, and soils were used for assessing risk to aquatic communities (Assessment Endpoints 1, 2 and 3), wetland communities (Assessment Endpoints 18 and 19), and terrestrial soil and plant communities (Assessment Endpoints 4 and 5). The BMs were compared to maximum measured concentrations of the surface water, sediments and soils to estimate risk for this ERA.

• Risk to the mammalian and avian communities (Assessment Endpoints 6 to 16) was based on model-calculated dietary exposures utilizing conservative life history parameters (lowest body weights, highest ingestion rates), maximum contaminant concentrations, and maximum dietary concentration or bioaccumulation (BAF) values.

• An area use factor (AUF) of 1.0 was applied to the model-calculated risk assuming each receptor spends 100% of its time within each AOI within the MA and PIA.

• Total exposure for estimating risk of the metals and radionuclides in the surface water, sediments and soils for each assessment endpoint was inclusive of natural background levels. Natural background levels have been defined as the "concentrations of hazardous substances consistently present in the environment which has not been influenced by localized human activities". For example, several metals

(Al, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Zn) occur naturally in the bedrock and soil of Washington State due solely to geologic processes (Juan 1994). Similarly, concentrations of natural U and associated radioisotopes would be present at natural background levels expected for a mineral-rich area. For this ERA, total exposure for estimating risk of the metals and radionuclides in the surface water, sediments and soils for each assessment endpoint was inclusive of natural background levels.

• Bioavailability of metals and radionuclides was assumed to be 100%. No consideration on controlling bioavailability based on the strength of binding of the metals by soils or sediments was applied in the assessments.

The intent of this systematic process and conservative approach was to optimally utilize the site-specific data that were available and to reduce the likelihood that risks would be underestimated, while supporting informed management decisions.

The baseline ecological risk assessment (BERA), presented in Sections 3 to 7, characterized the risk to 22 assessment endpoints encompassing the aquatic, riparian, and terrestrial ecosystems within the MA and PIA.

#1: Periphyton Community.
#2: Benthic Macroinvertebrate Community.
#3: Fish Community
#4: Terrestrial Soil Community.
#5: Terrestrial Plant Community.
#6: Herbivorous Mammal Community.
#7: Carnivorous Mammal Community.
#8: Omnivorous Mammal Community.
#9: Piscivorous Mammal Community.
#10: Soil Invertebrate Feeding mammal Community.
#11: Insectivorous Avian Community.
#12: omnivorous avian community.
#13: Soil Invertebrate Feeding Avian Community.
#14: Carnivorous Avian Community
#15: Piscivorous Avian Community.
#16: Herbivorous Avian Community
#17: Amphibian Community
#18: Wetland Plant Community
#19: Wetland Invertebrate Community
#20: Aquatic Animal Populations Related to TIR Exposure.
#21: Riparian Animal Populations Related to TIR Exposure.
#22: Terrestrial Plant and Animal Populations Related to TIR Exposure.

8.1 Aquatic Ecosystems - Assessment Endpoints 1,2, and 3

Assessment Endpoints 1, 2, and 3 characterized risk of metals contamination to aquatic ecosystems in the MA and PIA. Risk was based exclusively on conservative screening-level BM values and maximum concentrations of metals in surface water and sediments. It was concluded that the periphyton, benthic macroinvertebrate, and fish communities are at risk at all AOIs within the MA and PIA (Tables 22, 23, and 24).

The hazard quotients (HQ) for several of the COPCs, particularly for Al, Be, Cd, Co, Cu, Pb, Mn, Ni, Ag, Se, U, and Zn, tended to be one to two orders of magnitude higher within the AOIs of the MA than the PIA. The PCP and Pit 3 had a higher number of COPCs present and the most elevated HQs.

The drainages in the PIA tended to have a more COPCs compared to the AOIs within Blue Creek. The predominant COPCs in the drainages and Middle Blue Creek included Al, Ba, Be, Cd, Co, Cu, Pb, Mn, Ni, Se, U, and Zn. Upper Blue Creek and Lower Blue Creek had the least number of COPCs present.

Risk to the aquatic ecosystems was based primarily on screening level BM values along with some supporting lines of evidence from site-specific studies conducted in March 2003 that served to document adverse effects in the system. Regardless of the poor water quality conditions (low pH, high SO_4, high hardness) in the lacustrine habitats in the MA, the high metals concentrations in surface water and sediment pose substantial risk. The PIA drainages are also characterized by poor water quality. Additionally, several drainages flow intermittently or have low-flow conditions that could impact supporting and sustaining a diverse aquatic community. However, the wide range and magnitude of COPCs in the PIA drainages would pose risk to the aquatic communities independent of the other factors.

Site-specific aquatic studies conducted in March 2003 indicated a shift in macroinvertebrate communities from Upper to Middle and Lower Blue Creek (Appendix O). Upper Blue Creek is characterized by low hardness, low SO_4, and low total dissolved solids. Middle and Lower Blue Creek are influenced by water from the Eastern Drainage that increases metals, hardness and SO_4 concentrations, and conductivity. However, the effect of the Eastern Drainage on the aquatic communities of Blue Creek is associated with some uncertainty. There appears to be risk associated with mine-related COPCs, but the magnitude of the risk and the links to causative factors in water and sediment chemistry are confounding. The limited data collected for this study do not address the differential effects of in-place COPCs (COPCs that deposited over time in the sediments) versus COPCs released from the mine versus non-COPC water quality parameters.

8.2 Terrestrial Ecosystems - Assessment Endpoints 4 through 16

Terrestrial ecosystems were characterized based on the viability and function of the terrestrial soil and terrestrial plant communities (Assessment Endpoints 4 and 5) along with the viability and function of the mammalian and avian communities (Assessment Endpoints 6 through 16).

Assessment Endpoints 6 through 16, incorporating aquatic, riparian, and the terrestrial ecosystems, were evaluated through the use of food chain models. Four exposure models were used for each receptor species to estimate abiotic exposure (i.e., surface water, sediments, or soils) and total exposure (abiotic exposure plus dietary component). Risk was evaluated based on calculating NOAEL-based HQ and LOAEL-based HQ. If both the NOAEL-based and LOAEL-based HQs exceeded 1.0, then the contaminant concentration demonstrated model-calculated risk. If the NOAEL-based HQ was greater or equal to 1.0 but the LOAEL-based HQ was not, then it was concluded that possible model-calculated risk may exist.

Assessment Endpoint 4 - Terrestrial Soil Community

Determination of risk to the terrestrial soil community was based exclusively on surface and subsurface soil concentrations exceeding conservative BM values for soils. Chromium, Mn, U, V, and Zn in surface soils exceeded the BM values at all AOIs within the MA and PIA. Arsenic, Co, Cu, Mo, and Ni also exceeded BM values at some locations. Four COPCs - Cd, Pb, Se, and Tl - exceeded the BM values at only the MA (Table 26).

Subsurface soil Cr, Mn, U, and V exceeded BM values at all AOIs in the PIA (Table 27). Arsenic exceeded its BM at some locations. Molybdenum and Zn exceeded BM values at only the East Haul Road.

Assessment Endpoint 5 - Terrestrial Plant Community

Determination of risk to the terrestrial plant community was based exclusively on surface and subsurface soil concentrations exceeding screening level BM values for plants. Chromium, Mn, U, V, and Zn exceeded plant BM values at all of the AOIs within the MA and PIA Arsenic, Co, Mo, and Ni exceeded the plant BM values at some locations. Cadmium, Pb, Se, and Tl exceeded the plant BMs at only the MA (Table 28).

Subsurface soil Cr, U, and V exceeded the plant BM values at all of the AOIs in the PIA. Arsenic, Mn, and Zn exceeded the plant BM values at some locations. Molybdenum exceeded the plant BM only at East Haul Road (Table 29).

Assessment Endpoint 6 - Herbivorous Mammal Community

Three receptors - white tailed deer, meadow vole, and muskrat - were used for modeling risk to the herbivorous mammal communities utilizing the terrestrial, aquatic, and riparian areas. When white-tailed deer was modeled, risk was driven by surface water and incidental soil ingestion (Table QB). When meadow voles or muskrat were modeled, risk was driven by metals in plant tissue (Tables QA and QC1). There was model-calculated risk to the herbivorous mammal communities from abiotic (water plus soil/sediment ingestion) exposure to Se, U, and V in the MA; U in the West Haul Road and the Central Drainage; and U in the Central Drainage riparian area. There was model-calculated risk to the herbivorous mammal communities from total exposure to Mn and U at each AOI within the MA and PIA.

There was model-calculated possible risk to the herbivorous mammals for most of the remaining COPCs within the MA and PIA, primarily driven by the dietary component.

Assessment Endpoint 7 - Carnivorous Mammal Community

The coyote and bobcat were used for modeling risk to the carnivorous mammal communities utilizing the terrestrial areas within the MA and PIA. Risk was driven by the dietary component which was based on maximum literature-derived BAF values for small mammals. There was model-calculated risk to the carnivorous mammals from total exposure to Cd, Mo, Se, U, and Zn in the MA and from exposure to Cd and U in the East and West Haul Roads (Tables QD and QE).

Possible risk to carnivorous mammals may exist from abiotic exposure of Se, U, and V in the MA and U in the West Haul Road. Risk may also exist to the carnivorous mammals from total exposure to Pb and V in the MA, and from exposure to Cd, Se, Mo, U, and Zn within the PIA depending on location.

Assessment Endpoint 8 - Omnivorous Mammal Community

The deer mouse and raccoon were used for modeling risk to the omnivorous mammal communities utilizing the terrestrial and aquatic areas within the MA and PIA. When the deer mouse was modeled for the terrestrial areas, risk to the omnivorous mammal community was driven by the metals concentrations in soil and surface water including As, Mn, Mo, Se, and V in the MA; As, U, and V in the Haul Roads; and V in the Northeast PIA and Southwest PIA (Table QF).

When the raccoon was modeled for the aquatic areas, risk to the omnivorous mammal community was primarily driven by abiotic exposure of U in the MA and by total exposure of Mn and U at several AOIs within the PIA (Table QG).

Possible risk to the omnivorous mammal community may exist from V in the MA and from Ba, Cd,, Se, and V at the AOIs within the PIA.

Assessment Endpoint 9 - Piscivorous Mammal Community

The mink was used for modeling risk to the piscivorous mammal communities utilizing the aquatic systems within the MA and PIA. Risk was primarily driven by the dietary component which was based on maximum literature-derived BAFs for fish. (Note: limited database on fish BAFs restricted the modeling to Cd, Ni, and U). Risk to the piscivorous community in the MA was driven by predicted Cd, Ni, and U in fish particularly at Pit 3, PCP, and the Blood Pool. In the PIA the piscivorous mammal community was at risk from predicted Cd, Ni, and U in fish at the Central Drainage and U in fish at the Upper Eastern Drainage. Risk to the piscivorous mammal community was also driven by abiotic exposure of U at the PCP in the MA and at the Central Drainage in the PIA. Possible risk from total exposure of U may exist at upper, middle and lower Blue Creek AOIs (Table QH).

Assessment Endpoint 10 - Soil Invertebrate Feeding Mammal Community

The masked shrew was used for modeling risk to the soil invertebrate feeding mammal communities utilizing the terrestrial systems within the MA and PIA. Model-calculated risk to the soil invertebrate feeding mammal community was determined from abiotic exposure to As, Mn, Mo, Se, U, and V in the MA; and to As, U, and V in the East Haul Roads; U and V in the West Haul Road; and to V at the

Northeast PIA and Southwest PIA. When the dietary component incorporating the maximum BAF values for earthworms was applied in the modeling, risk was predicted for most of the COPCs (Table QI).

Assessment Endpoint 11- Insectivorous Avian Community

The cliff swallow was used for modeling risk to the insectivorous avian communities utilizing the terrestrial systems within the MA and PIA. Abiotic exposure of soil and surface water did not pose risk to the insectivorous avian community. There was model-calculated risk to insectivorous birds from total exposure to Cu at the AOIs within the MA and PIA. Possible risk from exposure of Cd, Cr, Pb, and Zn in the dietary component may exist within the MA and each of the AOIs within the PIA; Se may pose risk within the MA.(Table QJ).

Assessment Endpoint 12 - Omnivorous Avian Community

The song sparrow and mallard duck were used for modeling risk to the omnivorous avian communities utilizing the terrestrial and aquatic areas within the MA and PIA. When the song sparrow was modeled for the terrestrial areas, risk to the omnivorous avian community was predicted for Se in the MA (Table QK). When the mallard was modeled for the aquatic areas, risk to the omnivorous avian community was predicted from Cu at the PCP within the MA; and from Se in the Lower Eastern Drainage (Table QL).

Possible risk to the omnivorous avian community at the terrestrial systems may exist from abiotic exposure of Cr in the MA and from total exposure of Zn at all terrestrial AOIs in the MA and PIA when the song sparrow was used for the modeling. Possible risk to omnivorous birds for the aquatic systems may exist from As, Cd, Ni, U and Zn, primarily at the PCP within the MA.and As, Cd, Mn, Se, U, and Zn at various AOIs within the PIA.

Assessment Endpoint 13 - Soil Invertebrate Feeding Avian Community

The American robin and the Wilson's snipe were used for modeling risk to the soil invertebrate feeding avian communities utilizing the terrestrial, aquatic, and riparian areas at this site. When the American robin was modeled for the terrestrial areas, risk from abiotic exposure to the soil invertebrate feeding avian community was determined for Se in the MA. When the dietary component using maximum earthworm BAF values for the American robin was applied, risk to the soil invertebrate feeding birds was driven by predicted COPC concentrations for As, Cd, Cr, Cu, Pb, Se, and Zn in the MA and PIA (Table QM).

When the Wilson's snipe for the aquatic and riparian areas, risk from abiotic exposure to the soil invertebrate feeding avian community was determined for Cu and Ni in the PCP within the MA and Se at the Lower Eastern Drainage within the PIA. When the dietary component using the site-specific aquatic invertebrate tissue for the Wilson's snipe was applied, risk to the soil invertebrate feeding birds was driven by Cd and Se in the Lower Eastern Drainage and Se in the Upper Eastern Drainage (Tables QN1 and QN2).

Possible risk to the soil invertebrate avian community at the terrestrial systems may exist from total exposure of Mo and Tl in the MA when the American robin was used for the modeling. Possible risk to soil invertebrate feeding birds for the aquatic and riparian systems may exist from As, Cd, U, and Zn at some of the AOIs within the MA and PIA

Assessment Endpoint 14 - Carnivorous Avian Community

The great horned owl and the American kestrel were used for modeling risk to the carnivorous avian communities utilizing the terrestrial systems within the MA and PIA. When either species was modeled, risk from abiotic exposure to carnivorous birds was determined from Se in the MA. There is model calculated risk to carnivorous birds from total exposure to Cd, Cr, Pb, Se, and Zn in the MA and Cd in the Northeast PIA, East Haul Road, and West Haul Road. The predicted risk to the carnivorous birds is driven by estimated COPC concentrations defined by the maximum BAF values in small mammals (Tables QO and QP).

Possible risk to the carnivorous avian community may exist within the MA from abiotic exposure to As, Cr, Pb, and Zn, and from total exposure to As, Cd, Pb, Se, and Zn. Possible risk to the carnivorous avian community may exist from total exposure to Cd, Cr, Pb, and Zn at the AOIs within the PIA.

Assessment Endpoint 15 - Piscivorous Avian Community

The great blue heron and the bald eagle were used for modeling risk to the piscivorous avian communities utilizing the aquatic systems within the MA and PIA. (Note: a limited database on fish BAFs restricted the modeling to three COPCs - Cd, Ni, and U for the total exposure) Possible risk to piscivorous birds may exist from exposure to U in the MA. No risk to piscivorous birds were indicated within the PIA (Tables QQ and QR).

Assessment endpoint 16 - Herbivorous Avian Community

The spruce grouse and the song sparrow were used for modeling risk to the herbivorous avian communities utilizing the terrestrial systems within the MA and PIA. Abiotic exposure of Se in the MA imposes risk to the herbivorous avian community. Possible risk to herbivorous birds may exist from exposure to Cr, Pb, or Zn in the MA and from Zn at all terrestrial AOIs in the PIA (Tables QS and QT).

8.3 Riparian / Wetland Ecosystems - Assessment Endpoints 17, 18, and 19

The riparian and wetland habitats have been grouped together for the ecological characterization of this project area. The riparian and /or wetland habitats in the PIA include the banks and the low lying areas bordering the Eastern, Central, and Western Drainages, and Blue Creek. No natural riparian/ wetland habitats were identified in the MA.

Three assessment endpoints characterized the riparian/ wetland habitats within the PIA Assessment Endpoint 17 identified the amphibian community and Assessment Endpoints 18 and 19 characterized the wetland plant and invertebrate communities.

Assessment Endpoint 17- Amphibian Community

Determination of risk to the amphibian community was based on COPCs for which TRVs were available. Measured concentrations of metals in surface water and sediments were compared to the amphibian TRVs.

Copper and Zn in surface water posed a risk to amphibians at all of the AOIs. Possible risk from Al and Cd may exist at all of the AOI in the MA and PIA. Chromium and Pb did not pose a risk to amphibians at any of the AOIs (Table 30). Exposure to Cd and Zn in sediments posed risk to the amphibians at all of the AOIs (Table 31). Risk to amphibians from Sb, As, Ba, Be, Co, Mn, Mo, Se, Ag, Tl, U, and V could not be evaluated due to lack of applicable TRVs.

Assessment Endpoint 18 - Wetland Plant Community

Risk to the wetland plant community exists from the site-related contaminants within the PIA. Contaminant levels in the sediments were above the literature-based BM values for terrestrial plants. Chromium, Mn, Ni, U, and V exceeded plant BM values at all of the AOIs. Arsenic, Ba, Cd, Co, Se, and Zn exceeded plant BM values at some locations. Two COPCs exceeded the BM values at only one location: Cu, in Pit 3; and Tl, in Pit 4 (Tables 32 and 33).

Assessment Endpoint 19 - Wetland Invertebrates

Risk to the wetland invertebrate community exists from the site-related contaminant within the PIA. Contaminant levels in the sediments were above the conservative BM values for sediments. Measured concentrations of Sb, Mn, Ni, Se, and U exceeded sediment invertebrate BM values at all of the AOIs in the MA and PIA. Arsenic, Ba, Be, Cd, Co, and Zn exceeded sediment invertebrate BM at some locations. Two COPCs exceeded the sediment BM at only one location: Cu, in Pit 3; and Ag, in the Upper East Drainage (Tables 34 and 35).

8.4 Total Ionizing Radiation - Assessment Endpoints 20, 21, and 22

Risk from TIR to aquatic biota, riparian animals, terrestrial animals, and terrestrial plants was evaluated following USDOE (2002) guidance. For the SLERA, the general conservative screening methodology was conducted using the maximum concentrations of the site-specific isotopes in water, sediments, and soils. Risk to the three assessment endpoints within the BERA followed the same procedures as the SLERA with the exception that the central tendency concentrations of the site-related isotopes were used for calculating TIR exposure instead of the maximum concentrations.

Assessment Endpoint 20 - Aquatic Animal Populations

Pit 3, Pit 4, the PCP, and Blood Pool exceeded the TIR criteria of 1 rad/day for the protection of aquatic animals (Table 36). Surface water TIR exposures drive the risk with elevated TIR at each of these AOIs. Only the Outfall Pond had TIR of less than 1 rad/day.

The Central and Northeastern Drainages exceeded 1 rad/day. Surface water TIR drives the risk with elevated TIR at these two AOIs. The Western, Upper Eastern, and Lower Eastern Drainages, Upper Blue Creek, Middle Blue Creek, Lower Blue Creek, and FDR Lake, had TIR less than 1 rad/day, indicating no TIR risk to aquatic animals (Table 36).

Assessment Endpoint 21 - Riparian Animal Populations

Only the Central Drainage exceeded the TIR criteria of 0.1 rad/day for the protection of riparian animals. The Western Drainage, Upper Eastern and Lower Eastern Drainages, Middle Blue Creek, and Lower Blue Creek, had TIR of less than 0.1 rad/day indicating no TIR risk to riparian animals (Table 37).

Assessment Endpoint 22 - Terrestrial Plant and Animal Populations

All AOIs in the MA and PIA had TIR exposures of less than 0.1 rad/day for terrestrial animals (Table 38a) and less than 1.0 rad/day for terrestrial plants (Table 38b) indicating no TIR risk to terrestrial plant and animal populations.

9.0 CONCLUSIONS

The Midnite Mine site is an inactive uranium mine, in a mineral-rich area, and so high concentrations of metals and radionuclides were expected in all excavated areas (MA), all areas covered with waste rock (Haul Roads), and all areas within the direct influence of surface water or groundwater runoff (PIA drainages). Risk to the three ecosystems - aquatic, riparian/wetland, and terrestrial - within the MA and PIA are summarized as follows:

9.1 Aquatic Ecosystems

- High number of COPCs were identified within the aquatic habitats of the MA and the PIA. While none of the COPCs could be eliminated, those mine-related COPCs which were more pervasive, and of higher magnitude stand out (U, Al, Be, Cd, Co, Cu, Mn, Ni, Pb, Se, Ag, and Zn).

- Lacustrine habitats within the MA posed the greatest risk to aquatic communities based on the magnitude of the HQs, particularly at Pit 3, PCP, and Blood Pool. In addition, the poor water quality conditions (low pH, high SO_4 concentrations, and high conductivity) further pose significant risk to aquatic life in these habitats.

- The lacustrine habitats within the MA are an attractive nuisance to wildlife (elk, deer, etc.) for water ingestion and the possible consumption of mineral salts that may be available around the perimeter of these habitats. These salt formations may potentially increase risk; however, the consumption of salts was not quantified as an exposure in this ERA, nor was the salt analyzed for COPCs.

- The drainages within the PIA pose risk to the aquatic communities based on metals contamination. In addition, the intermittent and/or low flow conditions along with the poor water quality conditions (e.g. low pH, high sulfate, and high conductivity) further pose risk to aquatic life within the drainages. The drainages continue to be a conduit for the transport of contaminants from the MA to Blue Creek.

- The onsite WTF, which operates from Spring to Fall, and the seep collection system, which operates year round, serves to significantly reduce the transport of contaminants from the MA to the drainages and Blue Creek. When the WTF is not operating from Fall to Winter, higher concentrations of contaminants from the MA are observed flowing to the drainages and Blue Creek.

- Blue Creek below the confluence of the Eastern Drainage is at risk from the mine drainage. There is a level of uncertainty regarding the causative agents imposing risk to the aquatic communities in Blue Creek including contamination from metals and TIR, and reduced water quality (e.g., high SO_4, high hardness, high conductivity).

- Risk to aquatic animal populations associated with TIR were found in the lacustrine habitat within the MA and in the Central and Northeastern Drainages.

9.2 Terrestrial Ecosystems

- The MA, characterized as a physically disturbed area, provides limited and poor quality habitat for wildlife. Some species of wildlife (e.g., marmot and cliff swallow) that have been reported to inhabit the MA are at risk. Wildlife that would utilize the MA for water, grazing, or salt consumption are also considered at risk. The East and West Haul Roads which were constructed and paved with gravel and waste rock from the MA presents a significant source of contamination within the PIA.
- Model calculated risk to the mammalian communities based on conservative food chain exposure was determined for herbivorous, carnivorous , omnivorous, piscivorous, and soil invertebrate feeding mammals. In general, the greatest predicted risk to the mammalian communities, particularly the herbivorous, carnivorous, omnivorous, and soil invertebrate feeding mammals was determined within the

MA. A higher number of COPCs was predicted to pose risk to these mammalian communities within the MA than at AOIs within the PIA.

For the AOIs within the PIA, a similar number of COPCs was predicted to pose risk between the Northeast and Southwest PIAs and the East and West Haul Roads for the herbivorous mammals based on abiotic exposure, for the carnivorous mammals based on total exposure, for omnivorous mammals based on abiotic and total exposures, and for soil invertebrate feeding mammals based on abiotic exposure. Numerous COPCs were predicted to pose risk within both the MA and PIA when total exposure was modeled for the herbivorous mammal and soil invertebrate feeding mammal communities. For the herbivorous mammals, risk was driven by plant tissue. For the soil invertebrate feeding mammals, risk was driven by the earthworm BAF.

Risk to the piscivorous mammal community was limited to possible risk from abiotic exposure to one COPC (U) within the MA and from abiotic exposure to one COPC (Mn) at Middle Blue Creek. When fish BAF values were applied to the models, a higher number of COPCs were predicted to impose risk at the AOIs within the MA than the PIA.

- Model calculated risk to the avian communities based on conservative food chain exposure was determined for insectivorous, omnivorous, soil invertebrate feeding, carnivorous, piscivorous, and herbivorous birds. In comparison to the mammalian communities, the avian communities had fewer COPCs that were predicted to pose risk within the MA and PIA. The greatest predicted risk to some of the avian communities, particularly the omnivorous, the soil invertebrate feeding, and herbivorous birds was determined within the MA. A higher number of COPCs was predicted to pose risk to these avian communities within the MA than at AOIs within the PIA.

For the omnivorous and herbivorous birds, four COPCs were predicted to pose risk within the MA and one COPC within the PIA. For both the soil invertebrate feeding birds and carnivorous birds, only Se was predicted to pose risk from abiotic exposure within the MA while a higher number of COPCs was predicted to pose risk from total exposure, driven either by the earthworm BAF values for the soil invertebrate feeding birds or the small mammal BAF values for the carnivorous birds. For the insectivorous avian community no risk was determined based on abiotic exposure. When total exposure was modeled for the insectivorous birds, five COPCs were predicted to be at risk within the MA and the PIA. Risk to the piscivorous avian community was limited to possible risk from abiotic exposure to U at Pit 3 and PCP within the MA.

- Risk to the soil microorganisms and terrestrial plant communities was greatest within the MA having the highest number of COPCs present and the highest magnitude of HQs. Within the PIA, the East and West Haul Roads had a higher number of COPCs than the Northeast PIA and the Southwest PIA for both the ERA of the soil microorganisms and the terrestrial plant communities.

- An evaluation of risk to Threatened and Endangered Species (T&E) was and/or can be largely accomplished indirectly within this ERA. Although determination of “injury” to T&E species is not within the jurisdiction of the U.S. EPA, it is recognized that T&E species are part of the environment which is to be evaluated within a BERA. Subsequently, risk to present or potential T&E species can be indirectly accomplished or implied within the selections of the species models and input parameters for assessment endpoints that would be appropriate to the T&E species. For example, in this ERA, the bald eagle was used as a receptor for assessing risk to the piscivorous birds. Likewise, if wolves were to move back into the project area, the coyote, which was one of the receptors used for carnivorous mammal community, could be aligned with the wolf as a surrogate species for characterizing risk to carnivorous mammals.

- Risk to terrestrial plant and animal populations associated with TIR were not found in the MA or the PIA. There is uncertainty associated with the animal exposure screening, because one potentially significant contributor to exposure to some wildlife that was not included in this study was the mineral salt deposits found around the perimeter of water bodies in the MA.

- Risk to ruminants (e.g., deer, elk, sheep) may exist from dietary intake of sulfate (SO_4-S) that could cause copper deficiency due to the high levels of SO_4 in the surface waters of the aquatic systems, particularly within the MA (See Section 7.3).

9.3 Riparian/Wetland Ecosystems

- The six riparian/ wetland AOIs within the PIA pose risk to the amphibian, wetland plant and invertebrate communities based on the high number of COPC present and their concentrations. The drainages including Central, Upper Eastern, and Lower Eastern Drainages along with Middle Blue Creek tended to have ten or more COPCs present. Upper Blue Creek and Lower Blue Creek had the fewest COPCs present.

- No natural riparian/wetland habitats exist within the MA.

- Risk to riparian animal populations associated with TIR were found only in the Central Drainage.

9.4 Summary of Conclusions

The lines of evidence for characterizing risk are primarily based on either comparing maximum exposure levels with conservative BM values, or utilizing conservative model-calculated dietary exposures, or screening for risk of TIR based on maximum and central tendency values of the radionuclides. Additional site-specific investigations would aid in further refining and potentially lowering the estimated risk to the assessment endpoints. However, these additional investigations would not be expected to alter the final conclusions of this ERA in relation to the sources of the COPCs and the overall environmental degradation at this site. Specifically, these final conclusions entail:

• The MA presents a dominant impact to the ecosystems as a visibly disturbed area that provides limited and poor quality habitat for wildlife. The MA presents an ecological risk from chemical exposure to wildlife. The lacustrine habitats within the MA are considered attractive nuisances to wildlife for watering and consuming salt deposits around the perimeter of these artificial formations. The MA is also a source of contamination to the surrounding environment.

• The East and West Haul Roads, constructed and paved with gravel and waste rock from the MA, present a significant source of contamination within the PIA. Further dispersion of contaminants from these haul roads to adjacent areas is anticipated.

• The Northeast PIA and Southwest PIA may pose risk to some wildlife, particularly for those communities that would utilize or inhabit these areas 100% of the time. However, these areas are not physically disturbed and do not appear chemically impacted by transport of COPCs from the MA.

• The drainages serve as primary conduits for the transport of COPCs from the MA to Blue Creek. The in-place contamination of COPCs within the drainages pose risk to aquatic communities and wildlife. In addition, the intermittent and/or low flow conditions along with the poor water quality conditions (e.g., low pH, high sulfate, and high conductivity) further pose significant risk to aquatic life within the drainages.

• The seep collection system and WTF serves to reduce the metals loading from the MA to the drainages and Blue Creek. Higher loading of contaminants to these aquatic systems would occur in the absence of seep collections and water treatment.

• Blue Creek below the confluence of the Eastern Drainage is at risk from the MA drainage. Both the Middle and Lower Blue Creek reaches are influenced by water from the Eastern Drainage that increases metals, hardness and sulfate concentrations, and conductivity. However, uncertainty on the magnitude of the risk of the COPCs and the links to causative factors in water and sediment chemistry are confounding. Although the COPC levels alone would indicate the potential of exposure and risk exists, additional monitoring would be recommended to determine the need for active remediation in Blue Creek.

10.0 RISK MANAGEMENT CONSIDERATIONS

This section initiates risk management. Risk management is Step 8 of the Ecological Risk Assessment guidance for the Superfund (USEPA 1997). It serves to integrate the baseline ecological risk assessment (BERA) results with information that supports risk management decisions. This section identifies contaminants in surface water, soil, and sediments which contribute the most risk (risk drivers), discusses their distribution in the study area, and develops concentrations for these contaminants that would provide ecological protection. Human health and ecological risk drivers, also called contaminants of concern (COCs), are generally the focus of remedy selection. This section does not alter the basis or conclusions of the BERA.

The BERA was conducted using conservative inputs, as stated in the uncertainty section (Section 7.0) and the summary of results (Section 8.0). Risk was characterized based on chronic benchmarks or toxicity reference values (TRV) and conservative exposure estimates for each assessment endpoint. This approach was taken to assure that ecological risk would not be underestimated. EPA takes this approach to support the selection of remedies which protect human health and the environment. However, following assessment of risks, EPA considers the confidence in the inputs and the risk conclusions, as well as the severity of the risks at the site. In this way, protective and cost effective site decisions can be made. To support this, risk managers need to know which contaminants may pose ecological risk; which pose the greatest risk to the assessment endpoints; where and in what media the risks are highest; and how reduction of risks can be achieved most effectively.

10.1 Overall Approach

To focus on risk drivers, EPA adjusted the inputs to the hazard quotients (HQs) developed for the BERA to produce a less sensitive assessment of risks. If the resulting adjusted hazard quotient (AHQ) for a contaminant is greater than 1, the contaminant is identified as a probable risk driver. EPA has greater confidence in the risks posed by these contaminants and can focus risk management decisions on these risk drivers. Contaminants with AHQs less than 1 were not considered risk drivers but are recognized as contributing to the total risk.

As with HQs in the BERA, the AHQs calculated for identification of risk drivers used either environmental media-based (EMB) benchmarks or dietary exposure models. For assessment endpoints where hazard quotients are based on direct comparison of site concentrations to toxicity benchmarks in soil, sediments, or water, the benchmarks used in the BERA (NOAELs) were increased by a factor of 10. For assessment endpoints where the BERA used models to address dietary exposures, the chronic toxicity benchmark (LOAEL) was also increased by a factor of 10.

Once risk drivers are identified, protective concentrations in environmental media are derived to provide “risk-based” preliminary remediation goals (PRGs). These risk-based PRGs were derived using either the EMB benchmarks or the representative exposure estimates for the assessment endpoints based on dietary exposures used in the BERA.

The risk-based PRGs were then compared to ecological derived Applicable or Relevant and Appropriate Requirements (ARARs) and to background conditions. In some cases, the risk-based PRGs are lower than ARARs, because the risk-based PRGs are based on conservative assumptions with uncertainties. In such cases, EPA often relies on the ARAR as the PRG. If the ARAR-based PRG is below background, then the PRG should default to background.

10.1.1 Adjusted HQs for Environmental Media-Based Benchmarks

In the BERA, risk for eight of the assessment endpoints was characterized using chronic NOAEL media-based benchmarks. The chronic NOAEL benchmarks for these assessment endpoints are literature-based values for environmental media exposures, and are levels in soil, sediments, or water for which no adverse effects are expected for those assessment endpoints. The assessment endpoints evaluated this way were the viability and function of the following communities:

#1: periphyton community
#2: benthic macroinvertebrates
#3: fish
#4: terrestrial soil invertebrates
#5: terrestrial plants
#17: amphibians
#18: wetland plants
#19: wetland invertebrates

To identify risk drivers for these endpoints, a scaling factor of 10 was applied to the chronic NOAEL benchmark values, and central tendency (CT) media concentrations were used to calculate an AHQ. This approach is consistent with several publications that have reviewed the application of factors for converting toxicity values, as discussed in Section 7.3 of the BERA.

The AHQ is expressed as follows:

$$\text{AHQ} = \frac{\text{Central Tendency Exposure Concentration}}{\text{Chronic NOAEL X 10}}$$

10.1.2 Adjusted HQs for Dietary Exposures

Risk for the remaining eleven assessment endpoints was characterized in the BERA based on dietary exposure models and the LOAEL. The endpoints assessed in this way are the viability and function of the following communities:

#6: herbivorous mammals
#7: carnivorous mammals
#8: omnivorous mammals

#9: piscivorous mammals
#10: soil invertebrate feeding mammals
#11: insectivorous birds
#12: omnivorous birds
#13: soil invertebrate feeding birds
#14: carnivorous birds
#15: piscivorous birds.
#16: herbivorous birds

To identify risk drivers for these assessment endpoints, a conversion factor of 10 was applied to the chronic LOAEL used in the BERA, and central tendency (CT) media concentrations were used to calculate an AHQ. Applying a factor of 10 to the LOAEL converts the LOAEL to a threshold above which acute effects or lethality are predicted to occur. Justification for the conversion factor of 10 may be found in Section 7.3 of the BERA.

10.1.3 Development of Preliminary Remediation Goals

Once risk drivers are identified based on AHQs, PRGs are then derived for surface water, sediment, and soil. The PRGs are either risk-based that would derive protective concentrations of environmental media, or ARAR- based, or background.

The risk-based PRGs for soils and sediments were derived for the most sensitive endpoint or receptor for either those assessment endpoints for which risk was based on EMB benchmarks or for those assessment endpoints for which risk was derived from dietary exposures. For the dietary exposures, Model 4 was used to back-calculate to the sediment or soil concentrations with a target HQ of 1. Model 4 estimates exposure based on representative life history parameters and central tendency media concentrations and is described in detail in Section 4.3 of the BERA. If the risk-based PRG was below the ARAR as a result of the conservative assumptions and uncertainties associated with the BERA, then the ARAR is utilized as the PRG. If the ARAR-based PRG is below background, then the PRG should default to background. The use of background presents an acceptable means of identifying PRGs (EPA 2002). In addition, Cd and U risks to wildlife are additive, as acknowledged within the BERA and should also be a consideration in the development of PRGs.

Surface water PRGs are based on either ARAR values, or chronic benchmark values, or background.

10.2 Risk Driver Identification

In this section, potential risk drivers are first identified for groups of assessment endpoints, then reviewed and refined to develop a final list of risk drivers by media (water, sediment and soil).

10.2.1 Assessment Endpoints 1, 2, and 3 - Aquatic Ecosystems

Assessment Endpoints 1, 2, and 3 (periphyton, benthic macroinvertebrates, and fish) were used to characterize risk to aquatic ecosystems in the MA and PIA. BERA risk characterization for aquatic ecosystems was based exclusively on conservative screening-level chronic benchmark values and maximum concentrations of metals in surface water and sediments. To identify risk drivers, AHQs were calculated based on adjusted EMB benchmarks and both maximum and central tendency values. Tables 42 and 43 show the BERA HQs and the AHQs for total and dissolved metals in surface water, respectively, while Tables 44 and 45 summarize the HQs and AHQs for grab and composite sediments, respectively.

10.2.1.1 Surface Water Risk Drivers

For total metals in surface water, the AHQs exceeded 1 based on CT concentrations for at least one area of interest (Table 42) for 12 metals. Silver, Al, Ba, Be, Cd, Co, Cu, Pb, Mn, Ni, U, and Zn are carried forward as potential risk drivers for surface water. Dissolved metals (Table 43) provides similar results as total metals.

10.2.1.2 Sediment Risk Drivers

Tables 44 and 45 show AHQs for aquatic biota for metals (grab sediments and composite samples, respectively). Six metals exceeded the AHQ of 1 for the CT exposure estimates for sediments: Be, Cu, Mn, Ni, Se, and U. No sediment benchmark for V was available to characterize risk, and V was not carried forward as a risk driver.

AHQs for Be, Cu, and Ni only exceed 1 in MA sediments. Manganese and Se AHQs only exceed 1 in PIA sediments. Uranium meets risk driver criteria in both the MA and PIA. All six were retained as risk drivers in sediments for assessment endpoints 1, 2 and 3 (periphyton, benthic macroinvertebrates, and fish).

10.2.2 Assessment Endpoints 4 through 16 - Terrestrial Ecosystems

The BERA evaluated risk to terrestrial ecosystems in the MA and PIA using assessment endpoints 4 through 16. For assessment endpoints 4 and 5 (soil microorganisms and plant communities), the HQs are media based. For the mammalian and avian receptors in assessment endpoints 6 through 16, the HQs are based on exposure models. The BERA used four exposure models (See Figures 50 to 54) for each avian and/or mammalian receptor species to estimate exposure between media exposure (i.e., surface water, sediments, or soils) and total exposure (i.e., media exposure plus dietary component). Model 4 was used to determine the risk drivers for these assessment endpoints.

10.2.2.1 Assessment Endpoints 4 and 5 - Soil Community and Terrestrial Plants: Soil Risk Drivers

Risk to the terrestrial soil (endpoint 4) and plant communities (endpoint 5) was based on maximum surface and subsurface soil concentrations of metals compared to media benchmarks.

Tables 46 and 47 show soil community AHQs in surface and subsurface soils, respectively, using both the maximum and CT concentrations. For all areas, only Chromium, U, and V AHQs exceeded 1 based on central tendency exposures.

Tables 48 and 49 show the AHQs for terrestrial plants in soils. Only Cr, U, and V had AHQs exceeding 1 based on central tendency exposures.

Because the uranium and vanadium benchmarks are the same for soil communities and terrestrial plants, the AHQs are the same. The plant community is slightly more sensitive to chromium, however, resulting in higher Cr AHQs. Chromium, U, and V are carried forward as potential risk drivers in soil for these endpoints.

10.2.2.2 Assessment Endpoints 6, 7, 8 and 10 Terrestrial Ecosystem Mammals: Soil Risk Drivers

The BERA evaluated assessment endpoints 6, 7, 8 and 10 using dietary exposure models. Tables T-1, T-3, T-5, T-7, T-9, and T-11 (Appendix T) present the HQs and AHQs.

For the mammalian assessment endpoints 6,7,8 and 10, Table 50 identifies the contaminants that exceed an HQ or AHQ of 1 for each assessment endpoint using the four food chain models from the BERA. Based on AHQs using model 4, the potential risk drivers in soils are U for herbivorous mammals, and Cd, Pb and Se for soil invertebrate feeding mammals.

10.2.2.3 Soil Risk Drivers in Terrestrial Ecosystems for Birds: Assessment Endpoints 11, 12, 13, 14 and 16

The BERA used dietary exposure models to assess risk to five avian endpoints in the terrestrial ecosystem (insectivorous, omnivorous, soil invertebrate-eating, carnivorous, and herbivorous birds). Tables T-2, T-4, T-6, T-8, T-10 and T-12 (Appendix T) present the HQs and AHQs for each.

For the avian assessment endpoints 11, 12, 13, 14 and 16 , Table 51 identifies the contaminants that exceeded an HQ or AHQ of 1. Based on AHQs using model 4, lead exceeded the AHQ of 1 for assessment endpoint 13, the soil invertebrate-feeding bird community. Lead is therefore carried forward as a potential soil risk driver for this assessment endpoint.

10.2.2.4 Sediment Risk Drivers in Aquatic Ecosystems for Mammals and Birds: Assessment Endpoints 6,8,9,12,13, and 15

The BERA used dietary sediment exposures to assess risk to two mammalian and three avian endpoints in the aquatic ecosystem. Tables T-13 to T-25 (Appendix T) present the HQs and AHQs for these endpoints.

Tables 52 and 53 summarize these tables by identifying the metals that exceeded an HQ or AHQ of 1. Based on AHQs using model 4, U is a risk driver in sediment for the herbivorous and piscivorous mammal communities. Manganese also had AHQ values greater than 1 for herbivorous mammals (Table 53). The herbivorous mammal community is the more sensitive of the two endpoints for Mn.

Uranium and Mn are carried forward as potential sediment risk drivers based on herbivorous and piscivorous mammals (endpoints 6 and 9).

10.2.2.5 Riparian Sediment Risk Drivers for Mammals and Birds: Assessment Endpoints 6 and 13

The BERA evaluated risks from riparian sediment exposures for two assessment endpoints: herbivorous mammals and soil invertebrate feeding birds. Tables T-26 to T-31 (Appendix T) present the HQs and AHQs. Table 54 summarizes the results of these tables by identifying contaminants with HQs and AHQs greater than 1 for the four food chain models. No contaminants had AHQs greater than 1 using model 4.

10.2.3 Surface Water and Sediment Risk Drivers for Amphibians: Assessment Endpoint 17

10.2.3.1 Surface Water Risk Drivers

Table 55 shows the BERA HQs and the AHQs in surface water for the amphibian assessment endpoint using maximum and CT concentrations. Aluminum, Cu, and Zn exceeded the AHQ of 1 using CT concentrations in one or more areas, although none were greater than 1 in Blue Creek. These three metals are carried forward as potential risk drivers in surface water for this assessment endpoint.

10.2.3.2 Sediment Risk Drivers

Table 56 shows the AHQs based on maximum and central tendency concentrations for Cd and Zn. These were the only metals to exceed the BERA HQ of 1. Neither maximum nor central tendency concentrations resulted in AHQs greater than 1 for the amphibian assessment endpoint. For this assessment endpoint, no potential sediment risk drivers are identified.

10.2.4 Sediment Risk Drivers for Wetland Plants: Assessment Endpoint 18

The BERA assessed risk to the wetland plant assessment endpoint based on maximum concentrations of metals in stream sediments relative to media based benchmarks (See Table 3).

Table 57 shows the BERA HQs and AHQs. Across all areas, Cr, Mn, U, and V exceeded the AHQ of 1 in at least one area, although for Blue Creek manganese only has an AHQ of 1. These four metals are being carried forward as potential sediment risk drivers for the wetland plant community.

10.2.5 Sediment Risk Drivers for Wetland Invertebrates: Assessment Endpoint 19

The BERA assessed risk to the wetland invertebrate community based on maximum concentrations of metals in stream sediments relative to media-based benchmarks.

Table 58 shows the BERA HQs and AHQs calculated for both maximum and CT sediment exposures. Uranium and Se exceeded the AHQ of 1 for central tendency exposures in at least one area. They are being carried forward as potential sediment risk drivers for wetland invertebrates.

10.3 Summary: Risk Driver Identification

As stated in Section 10.1, risk drivers are being defined as metals which have an AHQ greater than 1 for at least one assessment endpoint. Risk drivers are grouped by media based on the AHQs for individual assessment endpoints.

10.3.1 Surface Water Risk Drivers

The AHQs for assessment endpoints 1, 2, and 3 (periphyton, benthic macroinvertebrate, and fish) indicate twelve potential ecological risk drivers in surface water: Al, Ba, Be, Cd, Co, Cu, Pb, Mn, Ni, Ag, U, and Zn. Beryllium and Pb had AHQs greater than 1 only in MA surface water. In addition, Al, Cu, and Zn are surface water risk drivers for amphibians (assessment endpoint 17) only.

10.3.2 Sediment Risk Drivers

Eight metals are carried forward as potential sediment risk drivers: Be, Cr, Cu, Mn, Ni, Se, U and V. Six (Be, Cu, Mn, Ni, Se, and U) are risk drivers based on periphyton, benthic macroinvertebrates, and fish (endpoints 1, 2, and 3). Manganese is also a risk driver for herbivorous mammals and wetland plants (endpoints 6 and 18). Selenium is also a risk driver for wetland invertebrates (endpoint 19). Chromium is a potential risk driver to wetland plants only (endpoint 18).

Vanadium is carried forward as a risk driver in sediments, as there is no means of concluding it does not pose a risk since sediment toxicity benchmarks are not available.

Uranium is a risk driver for numerous communities: periphyton, benthic macroinvertebrate, fish, herbivorous mammals, piscivorous mammals, wetland plants and wetland invertebrates (endpoints 1, 2, 3, 6, 9, 18 and 19). The piscivorous mammal community is the most sensitive endpoint. For this reason, it will be used to develop a candidate PRG for uranium in sediments based on model 4.

10.3.3 Soil Risk Drivers

Six metals are carried forward as risk drivers in soils: Cd, Cr, Pb, Se, U, and V. Chromium and V are risk drivers based on terrestrial plants. Selenium is a risk driver based on soil invertebrate-feeding mammals. Cadmium is a risk driver based on herbivorous mammals and soil invertebrate-eating mammals. Lead is a risk driver based on soil invertebrate feeding mammals and birds; and U is a risk driver based on terrestrial plans and herbivorous mammals.

10.4 Preliminary Remediation Goals

As described above, AHQs were used to reduce the sensitivity of the risk assessment for the purpose of identifying contaminants posing the greatest risk. For these contaminants, PRGs that are considered ecologically protective are then developed for potential use as cleanup objectives.

For surface water, PRGs are based on either ecological derived Applicable or Relevant and Appropriate Requirements (ARARs) values, or risk based chronic benchmarks (BM), or background. The ARAR-based PRGs are the surface water quality standards established by the Spokane Tribe of Indians (STI) or EPA recommended water quality criteria, depending upon the element (Tables 2 and 5). The risk-based PRGs are defined by chronic benchmark values used in the ERA (Section 2.3.2.1.3).

For soil and sediment risk drivers, PRGs are recommended based either being risk-based that would derive protective concentrations of environmental media based on the most sensitive assessment endpoint within the BERA, or ARAR-based, or background.

Table 60 presents the recommended PRGs and also provides background values calculated for the Remedial Investigation / Feasibility Study (RI/FS) (URS 2002, 2003).

10.4.1 Surface Water PRGs

Of the twelve ecological risk drivers in surface water, four have ARAR-based PRGs: Cu, Pb, Ni, and Zn that were used in the BERA (Tables 2 and 5). The recommended PRGs for three metals - Be, Co, and Mn - are based on the chronic benchmark values used in the BERA (Tables 2 and 5). Given that the ARAR and/or the chronic benchmark values were below background for Al, Ba, Cd, Ag, and U, the PRGs for these metals should be background.

All 12 surface water risk drivers had AHQs greater than 1 in the MA. Eight of the metals (Cd, Co, Cu, Mn, Ni, Ag, U, and Zn) had AHQs greater than 1 in some PIA drainages, but not in

Blue Creek. Two metals (Pb and Be) were identified as risk drivers only in the MA. Barium and Al were the only metals with AHQs greater than 1 in Blue Creek.

The AHQs for most of the surface water risk drivers were higher in the MA than the PIA drainages. For uranium, the AHQs are two orders of magnitude higher in the MA than in the PIA drainages. Many of the risk drivers in the PIA drainages tend to have AHQs that range between 1 and 2, with few AHQs greater than 10. This suggests that any remedial action that would significantly reduce the release of metals from the MA to surface water could be expected to have a substantial effect on achieving surface water PRGs in the downstream areas (e.g., PIA drainages and Blue Creek).

10.4.2 Sediment PRGs

Eight metals were identified as potential sediment risk drivers. These metals are Be, Cr, Cu, Ni, Mn, Se, U, and V. The development of sediment PRGs for Be, Cu, and Ni are not being recommended based on the reasons cited below.

Beryllium, Cu, and Ni were identified as sediment risk drivers only in the Pollution Control Pond (PCP) for assessment endpoints 1, 2, and 3. In addition, the AHQs for these three metals based on CT exposures within the PCP were low, ranging between 1 and 2. While it is possible that aquatic organisms such as benthic invertebrates or fish could be in the PCP, it should be recognized that the PCP does not currently provide natural aquatic habitat or habitat with the functional characteristics of the assessment endpoints being evaluated. Additionally, a future use scenario of the PCP being a functioning aquatic habitat is improbable. Also, the risk characterization for these three assessment endpoints is based upon the low sediment quality guidelines (SQG) (Table 4). The low SQG benchmarks represent a level that is not expected to cause an adverse effect. Given the minor, low-level exceedance of this no-effect benchmark, substantive risk reduction would not be expected from a focus on these contaminants.

In summary, sediment PRGs are proposed for Cr, Mn, U, Se, and V. Chromium and V were identified as risk drivers in sediments for assessment endpoint 18 (wetland plants). Manganese drove the risk for assessment endpoints 6 and 18 (herbivorous mammals and wetland plants). Selenium was a risk driver for assessment endpoints 1, 2, 3, and 19 (periphyton, benthic, fish, and wetland invertebrates). Uranium was a risk driver for assessment endpoints 1, 2, 3, 9, 18 and 19 (periphyton, benthic, fish, piscivorous mammals, wetland plants, wetland invertebrates).

10.4.2.1 Sediment PRGs for Chromium and Vanadium

Risk to wetland plants (endpoint 18) was based on literature benchmark LOAELs for terrestrial plants, as no aquatic plant values were found (Section 4.3.9). The AHQs for both metals ranged between one and two and tended to be evenly distributed between AOIs (Table 57). A review of the sediment data (Appendix E) show that few sediment samples, regardless of sampling location, are at or below the BM values of 1.0 mg/kg dry weight (dw) for Cr and 2.0 mg/kg (dw) for V. Given that sediments that are not affected by the mine have concentrations above the benchmarks and that the BM values are screening benchmarks, these BM values are not considered suitable PRGs for these elements.

An alternative PRG recommended for Cr is the Tribal ARAR for sediments of 43.4 mg/kg dw (Table 60).

For V, a sediment toxicity benchmark was not available to assess risk within the BERA. Given the lack of a suitable BM for V, PRG for V should be based upon background (Table 60).

10.4.2.2 Sediment PRG for Manganese

The herbivorous mammal community (endpoint 6) was the most sensitive endpoint for Mn in sediments (Table 54). When back calculations are applied to the dietary model for this assessment endpoint to hypothetically reduce the Mn concentrations to a LOAEL-based HQ of 1.0 and a NOAEL-based HQ of 1.0, sediment concentrations of 140 mg/kg dw for the LOAEL-based HQ and 40 mg/kg dw for the NOAEL-based HQ were yielded (Table 59).
Sediment concentrations of 140 mg/kg dw may not be necessary for ecological protection. There is considerable uncertainty with respect to the available toxicity reference value (TRV) for mammalian receptors. The mammalian TRV for manganese was developed from a single study, with the effect level related to Fe exposure, as the effect appears to be a competitive interference with Fe metabolism. There is, therefore, a low degree of confidence in the risk estimates based upon the mammalian TRV.

In addition, sediments in the MA, PIA, and background areas contain levels of manganese well above 140 mg/kg dw along with considerable variability in the distribution of Mn in all areas (Appendix E, Tables E-1 to E-28). Therefore, a background-based PRG (Table 60) is recommended for the MA and mine drainage areas. Further, due to the uncertainty in the risk estimates, active remediation of any sediment area based solely upon one element, such as Mn, may not be warranted.

10.4.2.3 Sediment PRG for Selenium

Selenium was identified as a sediment risk driver for areas in the PIA only and not in the MA for endpoints 1, 2, 3, and 19. However, it is noted that Se concentrations were below analytical detection limits in the MA, and thus it is uncertain that the MA has Se concentrations greater than any other area. In the PIA most of the selenium concentrations were also below analytical detection limits. However, one of the drainages, the Lower Eastern Drainage, presented some elevated concentrations (Appendix E, Table E-23).

In addition, the chronic benchmark was based on a conservative SQG value used in the BERA (0.1 mg/kg dw), resulting in a conservative estimation of risk. Given that selenium was mostly below analytical detection limits in the MA and PIA with the exception of a few elevated samples and given that the conservative benchmark is below background , a background-based PRG for Se is recommended.

10.4.2.4 Sediment PRG for Uranium

The AHQs for periphyton, benthic macroinvertebrates, and fish (endpoints 1, 2, and 3) identified U in sediments as the ecological risk driver based upon literature based benchmarks. A sediment concentration of 1,700 mg/kg U yields an AHQ of 1. A concentration of 170 mg/kg corresponds to an HQ of 1 using the chronic LOAEL, and 17 mg/kg corresponds to an HQ of 1 using the chronic NOAEL.

Using model 4 for herbivorous mammals (endpoint 6), an AHQ of 1 corresponds to a U concentration in sediments of 240 mg/kg dw, and the back calculations for the chronic LOAEL and NOAEL with the HQ of one corresponds to uranium concentrations in sediments of 24 mg/kg and 2.4 mg/kg, respectively (Table 59). For the herbivorous mammal exposure modeling, dietary exposures were based on maximum site data of plant tissue and the assumption that 100% of the diet is from the contaminated food source in a single AOI. Although the exposure modeling based on these assumptions is likely to overestimate risk to herbivorous mammals, the 24 mg/kg dw is recommended as a risk-based PRG for U in sediment.

Th risk-based PRG of 24 mg/kg dw would be protective of aquatic endpoints (i.e., endpoints 1, 2, 3, and 18). The difference between the risk-based PRG of 17 mg/kg dw derived from the chronic NOAEL value for endpoints 1, 2, and 3 and the risk-based PRG of 24 mg/kg dw is within the confidence limit of toxicity estimates. Assessment endpoint 18 (wetland plants) has a screening Bm of 5 mg/kg dw; however, there is a low degree of confidence that this value is an accurate risk threshold.

In summary, the sediment PRG for U should be either the risk-based value of 24 mg/kg dw or an appropriate background value. The use of background presents acceptable means of identifying PRGs (EPA 2002a); however, there should also be a consideration related to the soil PRG for U, since there is an interplay between the two media with sediment being deposited within the floodplain and soil being eroded into the surface water system. Given the mobility of sediments, the focus should be on controlling sources of sediment from the source areas.

10.4.3 Soil PRGs

Six metals are carried forward as risk drivers in soils: Cd, Cr, Pb, Se, U, and V. The development of soil PRGs for Cr, Se, and V are not being recommended for reasons cited below.

Chromium and V were identified as risk drivers based on assessment endpoint 5 (terrestrial plants); however, the only available toxicity benchmarks are screening level values. The AHQs of these metals are variable in the MA, the haul roads, and the Northeast and Southwest Downwind Areas but range between one and two in all areas. (Tables 48 and 49). While minor reductions in risk from these metals may result from soil cleanup based on other risk drivers, substantive risk reduction would not be anticipated from soil remedial action based only on clean-up goals for Cr or V. Consequently, no soil PRGs are proposed for either Cr or V. (Note: The CT concentration for Cr in the MA is 16.5 mg/kg dw compared to 9.6 mg/kg dw in the background. The CT concentrations for V in the MA is 28.2 mg/kg dw compared to 24.2 mg/kg dw [Appendix G]).

Selenium was identified as soil risk driver based on soil invertebrate-feeding mammals (endpoint 10) only in the MA, using Model 4 (Table 50). The modeling relied on conservative bioaccumulation factors (BAF) for earthworm tissue concentrations, and as a result the model may overestimate the risk to the soil invertebrate-feeding mammal community. (See Section 4.3.5). In addition, a review of soil concentrations of Se (Appendix G) suggests that while there is elevated Se within the MA compared to the PIA, a remedy based upon Se in soil would result in limited risk reduction. Subsequently, no soil PRG is recommended for Se.

Recommended soil PRGs are provided for Cd, Pb, and U. Cadmium is identified as a soil risk driver for herbivorous mammals and soil invertebrate-feeding mammals (endpoints 6 and 10); Pb for soil invertebrate feeding mammals and birds (endpoints 10 and 13); and U for terrestrial plants and herbivorous mammals (assessment endpoints 5 and 6). Cadmium and U risks to wildlife are additive, as acknowledged within the BERA and also within the development of the PRGs.

The development of risk-based soil PRGs for terrestrial plants, herbivorous mammals, and soil invertebrate-feeding mammals and birds (endpoints 5, 6, 10, and 13) using BERA values does not provide appropriate PRG values for Cd, Pb, and U. The dietary models used conservative BAF values to estimate exposure, resulting in HQs that likely overestimate the risk for these metals. Soil PRGs calculated from the BERA models are below background levels of Cd, Pb, and U. The PRG for U based on assessment endpoint 5 (terrestrial plants) would be 5 mg/kg dw, a benchmark value used for screening. Many soil samples in areas unaffected by the mine contain U concentrations above this value.

Therefore, background is recommended for soil PRGs for Cd, Pb, and U. Table 61 provides a summary of the soil data from Appendix G for these metals. Cadmium and lead concentrations presented low variability between CT and maximum concentrations for all areas including the background. For cadmium and Pb, a soil PRG based on background is anticipated to focus remediation on the MA. Cadmium is being carried forward as a PRG primarily because of the risks to wildlife based on potential additive effects with U.

For uranium, the two areas downwind of the MA (NE and SW PIA) had the lowest variability and the lowest maximum values for uranium in soils (Table 61). A high degree of natural variability of U for the background is suggested by the difference between the CT and maximum values. A soil PRG for uranium based on background is anticipated to focus remediation on the MA and other areas that contain mine waste material. Given the high degree of natural variability of uranium, a statistically based upper boundary of the uranium PRG is recommended.

10.5 Risk Management Conclusions

The implementation of the adjusted hazard quotients (AHQ) within this risk management section aided in focusing the list of COPCs to those metals which are concluded to be risk drivers based on a high confidence that substantiative ecological risk could exist and for which PRGs should be developed. The PRGs developed on this short list of risk drivers are either risk-based derived from the back calculation to an HQ of one of the most sensitive assessment endpoint to provide a protective media concentration; and/or deferring to Site functional benchmark values (*i.e.*, ARAR-based or chronic benchmarks); and/or background; and risk reduction through source control. Table 60 provides the recommended PRGs.

For surface water, twelve metals -Al, Ba, Be, Cd, Co, Cu, Pb, Mn, Ni, Ag, U, and Zn - were identified as surface water risk drivers. Surface water PRGs for these metals are assumed to be based on ARARs, or chronic benchmark values, or background (Table 60).

For sediments, eight risk drivers were identified: Be, Cr, Cu, Mn, Ni, Se, U, and V. Sediment PRGs were not recommended for Be, Cu, and Ni, since no substantive risk reduction would be expected to be accomplished.

Sediment PRGs for Cr, Mn, Se, U, and V are recommended. For Cr the recommended PRG is the Tribal sediment criterion of 43.4 mg/kg dw. For Mn, background is the recommended PRG. It is recommended that Mn related risk from sediments be addressed through a combination of the use of a background value for the PRG in areas where mine related loading of Mn to the surface water system is occurring. In “receiving areas” (Blue Creek) natural recovery monitoring is suggested as a means of either obtaining the PRG in the future and/or generating the data which allows for an evaluation of the need for additional action. For Se and V background is the recommended PRG. For U, the PRG recommendation is either the risk-based PRG of 24 mg/kg dw or a background value if background is higher.

For soils, six risk drivers were identified: Cd, Cr, Pb, Se, U, and V. Soil PRGs were not recommended for Cr, V, and Se, since no substantive risk reduction would be expected to be accomplished.

Soil PRGs for Cd, Pb, and U are recommended. Background soil concentrations for Cd and Pb are recommended as the PRG for these two elements. Cadmium is being carried forward as a PRG primarily because of the risks to wildlife based on potential additive effects with U. For U, a statistically based background value is the recommended PRG. Both the sediment and soil PRG for U need to be selected with consideration of the other because of the potential for redistribution of U both into and out of the surface water system. If a numerical PRG becomes necessary in a remedy selection based on background, then it is recommended to use background for the area of interest.

Overall, in consideration of risks, background levels, and site contaminant distribution, the conclusion for risk management suggests that active remediation be directed at the MA sources and areas near the mine which contain substantial amounts of mine waste material. In Blue Creek down-gradient of the mine drainages, there is a limited degree of confidence in the risk estimates. In addition the causal link between chemical stressors and effects is not clearly demonstrated by the stream community evaluation (Appendix O). Given the uncertainties in the down-gradient areas, active remediation of Blue Creek sediments is not recommended at this time. Additional ecological evaluation should be performed after source areas are remediated. The uncertainties and assumptions inherent in this risk assessment can be resolved in conjunction with future monitoring following the remedial actions at this site. This monitoring should be structured to trigger any future actions needed.

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Table 1. Ecological Exposure Pathways[a]
Midnite Mine Site
Wellpinit, WA

Exposure Media	Exposure Routes	Terrestrial Receptors														
		Soil Organisms			Wildlife (terrestrial/riparian ecosystem consumers)											
					Mammals						Birds					
					Herbivore	Herbivore	Invertivore	Omnivore	Carnivore	Carnivore	Herbivore	Herbivore	Invertivore	Omnivore	Carnivore	Carnivore
		Plants[b,2]	Microorganisms	Invertebrates	Meadow Vole	White-Tailed Deer	Masked Shrew	Deer Mouse	Coyote	Bobcat	Spruce Grouse	Song Sparrow	Cliff Swallow	American Robin	Great Horned Owl	American Kestrel
Stream/Pit Surface Water	Radiation	-	-	-	2	2	2	2	2	2	2	2	2	2	2	2
	Direct Contact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ingestion	-	-	-	*	*	*	*	*	*	*	*	*	*	*	*
Stream/Pit Sediment	Radiation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Direct Contact	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ingestion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surface Material[c]	Radiation	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Direct Contact	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o
	Ingestion	-	-	-	*	*	*	*	*	*	*	*	*	*	*	*
Pit Wall Material	Radiation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Direct Contact	o	o	o	-	-	-	-	-	-	-	-	-	-	-	-
	Ingestion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haul Road	Radiation	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Direct Contact	*	*	*	-	-	-	-	-	-	-	-	-	-	-	-
	Ingestion	-	-	-	*	*	*	*	*	*	*	*	*	*	*	*

Exposure Media	Exposure Routes	Aquatic Receptors			Terrestrial/Riparian Receptors							
					Wildlife (terrestrial/riparian ecosystem consumers)							
					Amphibian	Mammals			Birds			
					Invertivore	Herbivore	Omnivore	Piscivore	Herbivore	Invertivore	Piscivore	Piscivore
		Plants[2]	Invertebrates	Fish		Muskrat	Racoon	Mink	Mallard	Wilson's Snipe	Great Blue Heron	Bald Eagle
Stream/Pit Surface Water	Radiation	1	3	3	2	2	2	2	2	2	2	2
	Direct Contact	*	*	*	*	o	o	o	o	o	o	o
	Ingestion	-	o	o	o	*	*	*	*	*	*	*
Stream/Pit Sediment	Radiation	1	3	3	2	2	2	2	2	2	2	2
	Direct Contact	o	*	o	o	o	o	o	o	o	o	o
	Ingestion	-	o	o	o	*	*	*	*	*	*	*
Surface Material[d]	Radiation	-	-	-	2	2	2	2	2	2	2	2
	Direct Contact	-	-	-	o	x	x	x	x	x	x	o
	Ingestion	-	-	-	o	x	x	x	x	x	x	o
Haul Road	Radiation	-	-	-	2	-	-	-	-	-	-	-
	Direct Contact	-	-	-	-	-	-	-	-	-	-	-
	Ingestion	-	-	-	-	-	-	-	-	-	-	-

Radiation = Evaluated using the DOE's *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* USDOE (U.S. Department of Energy) 2002. A Graded Approach for Evaluating Radiation Doses to Aquatic, Riparian, and Terrestrial Biota. DOE-STD-1153-2002. July. (described in Section 2.3.2.3) See Footnotes 1, 2, and 3.
Direct Contact = Uptake by plants, invertebrates, fish, and amphibians through direct contact with soil, water, or sediment.
Ingestion = Direct ingestion of food and water and incidental ingestion of soil/sediment.
- = Pathway incomplete or not applicable; quantitative evaluation not performed
* = Pathway potentially complete and selected for quantitative evaluation.
o = Pathway potentially complete but not selected for quantitative evaluation as data or methods are lacking.
x = Pathway relatively unimportant for risk management decisions.
a - Tables adapted/modified from URS (URS Corporation) 2001b. Terrestrial Ecological Risk Assessment Approach for Midnit Mine RI/FS. Draft Technical Memorandum prepared for USEPA Region 10. October
b - Terrestrial Plants includes riparian plants or upland plants depending on habitat/location.
c - For the purpose of this exposure table, Surface Material includes surface material in the Mined Area (waste ore/protore stockpiles/backfilled pits), soils downwind in the Potentially Impacted Area (PIA), and riparian sediments.
d - For the purpose of this exposure table, Surface Material includes surface material in the Mined Area (waste ore/protore stockpiles/backfilled pits), and soils downwind in the Potentially Impacted Area (PIA).
1 - Radiation exposure compared with 1 rad/day for plants.
2 - Radiation exposure compared with 0.1 rad/day for terrestrial animals.
3 - Radiation exposure compared with 1 rad/day for aquatic and riparian animals.

Table 2: Benchmark Values for Soil, Sediment, and Surface Water
Midnite Mine Site
Wellpinit, WA

Analyte	Soil[a] (mg/kg) DW		Sediment[b] (mg/kg) DW		Surface Water[c] (µg/L)
Aluminum	50		9,400		87
Antimony	5		0.49		30
Arsenic	10		9.79		150
Barium	500		500		3.9
Beryllium	10		0.7		0.53
Cadmium	3		0.99		0.12[e]
Calcium	nb		nb		na
Chromium	0.4		43.4		nb
Chromium III	nb		nb		20[e]
Chromium VI	nb		nb		10
Cobalt	20		20		3
Copper	50		31.6		3.2[e]
Iron	200		10,000		1,000
Lead	50		35.8		0.7[e]
Magnesium	nb		6,100[d]		82,000
Manganese	100		736		80
Mercury	0.1		0.18		0.77
Mercury	nb		nb		0.012
Molybdenum	2		nb		na
Nickel	30		22.7		19[e]
Potassium	nb		nb		na
Selenium	1		0.1		5
Silver	2		0.5		0.08
Sodium	nb		nb		na
Thallium	1		3.8		4
Uranium	5		17		2.6
Vanadium	2		nb		19
Zinc	50		121		41[e]

a - Soil Benchmarks are based on selecting the lowest benchmark (either plants, or microorganisms, or earthworms) from the Oak Ridge database (See Table 3).

b- Sediment benchmarks are initially derived from the Consensus-based TEC database (See Table 4).
If a Consensus-based TEC value was not available, then the lowest Sediment Quality Guideline (SQG) was selected as the benchmark. All SQG values,except Uranium, are derived from EVS Consultants 1998. (See Table 4)
Uranium is derived from Environment Canada 2000 guidelines (See Table 4)
TEC = threshold effect concentration (below which harmful effects are unlikely)
d- Only a high SQG value was available for magnesium (See Table 4)

c- Surface water benchmarks are expressed in units of ug/L. See Table 5 for origin of values.
e- Based on water hardness of 30 ppm and dissolved metal concentrations. Calculated using US EPA 2002. National Recommended Water Quality Criteria. (See Table 5)
nb= no benchmark
na= not analyzed as a COPC (Contaminant of Potential Concern)
mg/kg = milligrams/kilogram
µg/L = micrograms/Liter
dw = dry weight

Table 3: Summary of Terrestrial Screening Values for Soil Organisms
Midnite Mine Site
Wellpinit, WA

(mg/kg, dry weight)

Analyte	Plants[a]	Microorganisms[b]	Earthworms[b]
Aluminum	50	600	nb
Antimony	5	nb	nb
Arsenic	10	100	60
Barium	500	3000	nb
Beryllium	10	nb	nb
Cadmium	3	20	20
Calcium	nb	nb	nb
Chromium	1	10	0.4
Cobalt	20	1000	nb
Copper	100	100	50
Iron	nb	200	nb
Lead	50	900	500
Magnesium	nb	nb	nb
Manganese	500	100	nb
Mercury	0.3	30	0.1
Molybdenum	2	200	nb
Nickel	30	90	200
Potassium	nb	nb	nb
Selenium	1	100	70
Silver	2	50	nb
Sodium	nb	nb	nb
Thallium	1	nb	nb
Uranium	5	nb	nb
Vanadium	2	20	nb
Zinc	50	100	200

a- Efroymson *et al.* 1997a Toxicological Benchmarks for Screening Contaminants of Concern for Effects on Terrestrial Plants. ES/ER/TM-85/R3, Oak Ridge National Laboratory, Environmental Sciences Division.
b- Efroymson *et al* . 1997b. Toxicological Benchmarks for Screening Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process. ES/ER/TM-126/R2, Oak Ridge National Laboratory, Environmental Sciences Division.
nb- no benchmark
mg/kg = milligrams/kilogram

Table 4: Sediment Quality Guidelines[a] and Consensus-based Sediment Effects[b]
Midnite Mine Site
Wellpinit, WA

(mg/kg, dry weight)

Analyte	Low SQG[a]	Mid SQG[a]	High SQG[a]	Consensus-Based TEC[b]	Consensus-Based PEC[b]
Aluminum	9,400	13,500	73,000		
Antimony	0.49	2	64		
Arsenic	3	32	404	9.79	33
Barium	500	nb	nb		
Beryllium	0.7	nb	nb		
Cadmium	0.58	0.7	41	0.99	4.98
Calcium	nb	nb	nb		
Chromium	9.8	39	360	43.4	111
Cobalt	20	50	nb		
Copper	14.9	96	206	31.6	149
Iron	13,345	200,000	280,000		
Lead	23	99	396	35.8	128
Magnesium	nb	nb	6,100		
Manganese	736	1,700	4,500		
Molybdenum	nb	nb	nb		
Mercury	0.04	0.49	2.7	0.18	1.06
Nickel	20	40	75	22.7	48.6
Potassium	nb	nb	nb		
Selenium	0.1	2.5	4		
Sodium	nb	nb	nb		
Silver	0.5	1	4.5		
Thallium	3.8	nb	7.45		
Uranium[c]	17	21	390		
Vanadium	nb	nb	nb		
Zinc	50	380	550	121	459

a. Sediment Quality Guideline values (mg/kg, dry weight) derived from (EVS Consultants. 1998. Compilation of Worldwide Sediment Quality Guidelines for Metals and Metalloids. Final. Prepared for: Intern. Lead Zinc Research Org., Inc. Intern. Copper Assoc., and Nickel Producers Environ. Research Org. September.)
b. Consensus-based TEC and PEC values (mg/kg, dry weight) derived from (MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol* . 39: 20-31.
c. Uranium values derived from (Environment Canada 2000. Priority Substances List Assessment Report - Releases of Radionuclides from Nuclear Facilities (Impact on Non-Human Biota). Draft. Health Canada. Canadian Environmental Protection Act, 1999. July.)
TEC = threshold effect concentration (below which harmful effects are unlikely)
PEC = Probable effect concentration (above which harmful effects are likely)
nb = no benchmark
mg/kg = milligrams per kilogram

Table 5: Surface Water Benchmarks[a]
Midnite Mine Site
Wellpinit, WA

(μg/L)

Analyte	US EPA[b]	US EPA[c]	Spokane Tribe[d]	EPA Region[e]	Source /EPA Region[e]
Aluminum	87		87		
Antimony	nb		nb	30	Regions 1,3,6,9
Arsenic	150[f]		150		
Barium	nb		nb	3.9	Regions 1, 6, 9
Beryllium	nb		nb	0.53	Regions 4, 9
Cadmium	0.25[g]	0.12[c]	1.03[h]		
Chromium III	74[g]	20[c]	74.1		
Chromium VI	11[g]		10[g]		
Cobalt	nb		nb	3	DC, Region 9
Copper	9.0[g]	3.2[c]	8.96[h]		
Iron	1000		1000		
Lead	2.5[g]	0.7[c]	2.52		
Magnesium	nb		nb	82,000	Regions 1,9
Manganese	nb		nb	80	DC, Region 9
Mercury	0.77		0.012		
Nickel	52[g]	19[c]	52		
Selenium	5		5		
Silver	nb		nb	0.08	Region 6
Thallium	nb		nb	4	Regons 4, 9
Uranium	nb		nb	2.6	Region 9
Vanadium	nb		nb	19	DC, Region 1,5,6,9
Zinc	120[g]	41[c]	105[h]		

a- Surface water benchmarks are expressed in units of μg/L.
b- Surface water benchmarks derived from the U.S. EPA Water Quality Criteria (USEPA, 2002 ,EPA-822-R-02-047)
c- Based on water hardness of 30 ppm and dissolved metal concentrations. Calculated using [US EPA (U.S. Environmental Protection Agency). 2002. National Recommended Water Quality Criteria: 2002. Office of Water. EPA-822-R-02-047.]
d- Spokane Tribe of Indians Water Quality Criteria, Feb, 2001.
e- Freshwater derived from U.S. EPA regions.
f- Based on total dissolved As
g- Based on dissolved metal and 100 milligrams per liter (mg/L) hardness
h- Based on water hardness of 100 mg/L (Cd, Cu, Zn)
μg/L = micrograms per Liter
nb= no benchmark
DC = U.S. EPA Headquarters, Washington, DC

Table 6. COPC Retained by AOI for Total Metals in Surface Water Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury[a]	Mercury[b]	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Mined Area																						
Pit 3	1,061			12.4	94.3	583	3.4	367	89.4	5.1	56.3	4.2	1,500		BM<ND	128	13.1	750		9,231		134
Pit 4	5.7			2.1	26.4	1.7			7.2		10.4		11.0		BM<ND	34.7		125		1,269		1.5
Blood Pool	1,333			5.6	52.5	75	2.7	264	372	16.6	17.9	2.2	460		16.7	66.3	5.4	BM<ND		3,142		32
Pollution Control Pond	1,379			3.1	113	583	3.3	443	120	1.6	44.3	4.9	1,775		16.7	145	14.3	63		11,539		146
Outfall Pond	5.2			20.0		3.1			2.6			1.2	4.6		BM<ND			11.3		98		
Other Areas of Interest																						
Far Western Drainage	18.6			13.7		BM<ND				1.3	2.6				BM<ND			BM<ND		3.8		
Western Drainage	47.5			14.9	8.1	42	1.0		18.8	3.0	3.6	3.2	199		16.7	21		62.5		40		12.2
Northeastern Drainage	472			37.2	12.5	BM<ND	3.3	7.8	17.2	66.0	32.9		8.2		BM<ND	3.8		BM<ND		412	3.2	1.5
Central Drainage	19.8			4.2	6.0	442		20	25.0			3.3	1,140		16.7	73		125		280		73
Upper Eastern Drainage	24.7			26.9		37	1.7		15.9	3.9	8.4	1.4	199		8.3	17		125		50		9.3
Lower Eastern Drainage	13.6			19.7		22			14.7		3.9	1.2	59.3		BM<ND	5.8		125		30		2.4
Upper Blue Creek	65.3			12.7		13			7.7	4.7	13.1				25.0			BM<ND		27		1.5
Middle Blue Creek	77.5			13.8		20	1.1		12.5	4.1	5.7	1.1	13.4		BM<ND	1.1		125		38		1.7
Lower Blue Creek	45.7			15.8		15	1.3		4.4	2.9	3.6	1.0	1.1		17.5			BM<ND		10.4		1.3
Franklin D. Roosevelt Lake	BM<ND			5.3	BM<ND	BM<ND			2.7						BM<ND			BM<ND	BM<ND			1.4
Background	98.2			70.3		51.7		6.7	5.3	20.2	9.0		27.9		BM<ND			BM<ND			1.1	

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)

See Tables D-1 to D-16 for calculations

- HQ<1 (Analyte not being retained)

- BM<ND or No Benchmark

- HQ of 1.0 to 9.9

- HQ>10.0

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

a = HQ calculated from BM derived from NRWQL

b = HQ calculated from BM derived from STWQC

NRWQC = National Recommended Water Quality Criteria
STWQC = Spokane Tribe Water Quality Criteria
> = greater than
< = less than
BM<ND = Benchmark value less than non detected value

Table 7. COPC Retained by AOI for Dissolved Metals in Surface Water Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Magnesium	Manganese	Mercury[a]	Mercury[b]	Nickel	Silver	Thallium	Vanadium	Zinc
Mined Area																		
Pit 3	BM<ND		3.7	94	815		310	94.0	9.1	3.7	1,538		BM<ND	131	BM<ND		BM<ND	136
Pit 4	NA		1.7		2.5		NA	2.5			9.9		BM<ND	1.6	BM<ND		NA	
Blood Pool	NA		5.4	34	75	2.6	NA	322		1.5	448		41.7	57	BM<ND			24
Pollution Control Pond			2.8	113	575		413	131	2.9	5.7	1,688		16.7	142	375			145
Outfall Pond			16.5		BM<ND					1.2	3.2		BM<ND		BM<ND			
Other Areas of Interest																		
Far Western Drainage			11.1		BM<ND								BM<ND		BM<ND			
Western Drainage			14.6	9.4	43.3		1.3	25		3.3	214		16.7	20	125			11.2
Northeastern Drainage					BM<ND		BM<ND		1.7		2.5		BM<ND		BM<ND			
Central Drainage			4.8	7.5	450		23.3	14.7		3.7	1,175		16.7	74	150			36
Upper Eastern Drainage			26.4		35			15.6	4.6	3.1	204		BM<ND	17.9	375			9.0
Lower Eastern Drainage			19.7		23.3			15.6		1.6	61			10.0	375			2.8
Upper Blue Creek			10.9		BM<ND				1.9				BM<ND		BM<ND			
Middle Blue Creek			15.4					11.6	1.6	1.3	13.4		BM<ND	1.6	250			
Lower Blue Creek			15.0		BM<ND				2.3	1.0			BM<ND		BM<ND			
Background			64.6		76.7		2.4		6.4		25.5				BM<ND			

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)

See Tables D-17 to D-31 for calculations

- HQ<1 (Analyte not being retained)

- BM<ND or No Benchmark

- HQ of 1.0 to 9.9

- HQ>10.0

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

a = HQ calculated from BM derived from NRWQL

b = HQ calculated from BM derived from STWQC

NA = analyte not analyzed

BM<ND = Benchmark value less than non detected value

NRWQC = National Recommended Water Quality Criteria

STWQC = Spokane Tribe Water Quality Criteria

> = greater than

< = less than

Table 8. COPC Retained by AOI for Sediment Composite Samples Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Mined Area																					
Outfall Pond	1.8				1.4					1.8						9.2			1.9	nb	
Other Areas of Interest																					
Far Western Drainage					1.1					1.1						5.8			3.4	nb	
Western Drainage	1.3				2.6	1.2		1.7		1.7			17.5		1.7	19.0			19.4	nb	
Northern Drainage	1.6		2.9		1.7					2.8				BM<ND		8.6			1.2	nb	
Northeastern Drainage	2.2		3.0		3.4					3.4			1.0		1.6	11.0			11.2	nb	
Southwestern Drainage										1.2						2.6			1.3	nb	
Central Drainage	1.9		1.8		2.6	1.6		1.2	2.9	1.8			3.4		1.7	8.8			60	nb	
Upper Eastern Drainage	1.7		1.1		2.4	9.8		1.2		1.8			29		12.7	39			3.4	nb	2.5
Lower Eastern Drainage	2.0		1.2		5.0	14.5		1.6		1.9			46		23	72			8.1	nb	4.6
Upper Blue Creek																BM<ND				nb	
Middle Blue Creek						1.1							5.0		1.8	BM<ND			5.3	nb	
Lower Blue Creek										1.3						BM<ND				nb	
Franklin D. Roosevelt Lake										1.6						6.1				nb	
Background	2.1	4.3	5.3		3.6					2.7		1.2			1.1	13			3.9	nb	

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)

See Tables E-1 to E-14 for calculations

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

nb = no benchmark
> = greater than
< = less than
BM<ND = Benchmark value less than non detected value

- HQ<1 (Analyte not being retained)

- BM<ND or No Benchmark

- HQ of 1.0 to 9.9

- HQ>10.0

Table 9. COPC Retained by AOI for Sediment Grab Samples Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Mined Area																					
Pit 3	3.3	BM<ND	5.6	1.0	10			3.1	3.2	3.2		1.8	1.8		3.9	BM<ND	BM<ND		54	nb	2.6
Pit 4	3.2	BM<ND	2.6		5.1			1.2		3.5		1.2	2.5		1.7	BM<ND			45	nb	
Blood Pool	2.8	3.3	7.7		1.6		1.2		2.8	6.7		1.3			1.3	BM<ND	BM<ND		6.1	nb	
Pollution Control Pond	17.0	BM<ND	2.7	1.4	43	11.3		8.3	23.8	1.7		1.6	5.9		33	BM<ND	BM<ND		340	nb	8.2
Outfall Pond	2.1	3.7	8.4		BM<ND			1.2	1.8	3.4		1.2	4.2		1.6	BM<ND	BM<ND		24	nb	1.2
Other Areas of Interest																					
Western Drainage	1.7	BM<ND			5.9	1.0				1.5			4.3		1.2	40			17.2	nb	
Central Drainage	2.3	BM<ND	1.2		6.0	2.8		5.0		2.1			6.4	BM<ND	10.1	52			214	nb	4.9
Upper Eastern Drainage	2.2	BM<ND	1.8		1.9			1.2		2.6		1.1	3.0		1.5	BM<ND	1.3		4.6	nb	
Lower Eastern Drainage	2.4	BM<ND	1.5		5.4	9.7		1.8		2.2			33		13.6	160			4.9	nb	3.3
Upper Blue Creek		BM<ND				1.0							10.2		1.4	BM<ND			1.2	nb	
Middle Blue Creek	2.3	BM<ND	8.2	1.3	3.8	9.7		7.0		3.1			86		20.3	14			2.8	nb	4.3
Lower Blue Creek	1.9	BM<ND	1.2		2.0					1.7		1.1	5.0		2.3	BM<ND	BM<ND		1.7	nb	
Franklin D Roosevelt Lake	1.0	BM<ND	1.3							2.1		1.0				BM<ND				nb	1.3
Background	3.4	2	12.6		6				1.5	3.6			1.9		1.1	16			6.3	nb	

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)

See Tables E-15 to E-28 for calculations

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

nb = no benchmark

> = greater than

< = less than

BM<ND = Benchmark value less than non detected value

- HQ<1 (Analyte not being retained)
- BM<ND or No Benchmark
- HQ of 1.0 to 9.9
- HQ>10.0

Table 10. COPC Retained by AOI for Riparian Sediment Samples Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Western Drainage	1.5	2.2			1.7					1.7			3.4		nb		27			6.6	nb	
Central Drainage	3.2	2.4	3.9		14.7	4.3		5.7	2.2	2.9		1.2	5.4		nb	12.4	2.7			134	nb	7.2
Upper Eastern Drainage	2.2	1.4	1.0		1.9					2.0		1.1	1.5		nb	1.1	BM<ND			2.1	nb	
Lower Eastern Drainage	2.4	BM<ND	1.9		4.9	10.9		1.5		2.4			23.2		nb	10.4	5.9			7.4	nb	2.5
Middle Blue Creek	1.3	1.3			2.0	1.2				1.4			5.1		nb	2.3	3.2			2.6	nb	
Lower Blue Creek		1.6								1.4					nb		2.6				nb	

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)   See Tables F-1 to F-6 for calculations

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

nb = no benchmark

> = greater than   < = less than

BM<ND = Benchmark value less than non detected value

- HQ<1 (Analyte not being retained)

- BM<ND or No Benchmark

- HQ of 1.0 to 9.9

- HQ>10.0

Table 11. COPC Retained by AOI for Surface Soil Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Mined Area	674		23.9			1.2	165	1.0	1.7	327	1.7	nb	51.9		16	1.5	90		2.5	96.4	66	7.6
Northeastern PIA	590		5.1				73			145		nb	19.9							3.1	24.8	2.3
Southwestern PIA	398						35			84		nb	6.2							3.1	14.0	1.2
East Haul Road	410		9.2				53	1.0	1.2	184		nb	11.6	1.0	2.5	1.0				17.7	20.5	1.8
West Haul Road	304		3				35		1.0	83		nb	11		3.7					52	14.2	1.6
Background	482		23.4				46	1.2		163		nb	16.4	1.2	1.7		42		1.6	9.1	20.9	1.2

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)

See Tables G-1 to G-6 for calculations

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

nb = no benchmark
> = greater than
< = less than
BM<ND = Benchmark value less than non detected value

- HQ<1 (Analyte not being retained)
- BM<ND or No Benchmark
- HQ of 1.0 to 9.9
- HQ>10.0

Table 12. COPC Retained by AOI for Subsurface Soil Based on Hazard Quotients
Midnite Mine Site
Wellpinit, WA

AOI	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Northeastern PIA	442		3.1				60			109		nb	12.7						2.0	17.6	
Southwestern PIA	300						26			76		nb	6.5						1.3	12.2	
East Haul Road	344		6.4				47			152		nb	6.5	2.2					9.6	17.3	1.0
West Haul Road	200						15			61		nb	4.7						1.5	9.2	
Background	330		8.6				37	1.1		143		nb	13.0	1.2					8.7	17.5	

HQ = Hazard Quotient (Calculated based on maximum concentration of metal analyzed)

See Tables G-7 to G-11 for calculations

BM = Benchmark

ND = Not Detected

COPCs retained based on whether HQ>1, or HQ=1, or BM<ND, or nb (no benchmark). See Tables D-1 to D-16 for details.

COPC = Contaminants of Potential Concern

AOI = Area of Interest

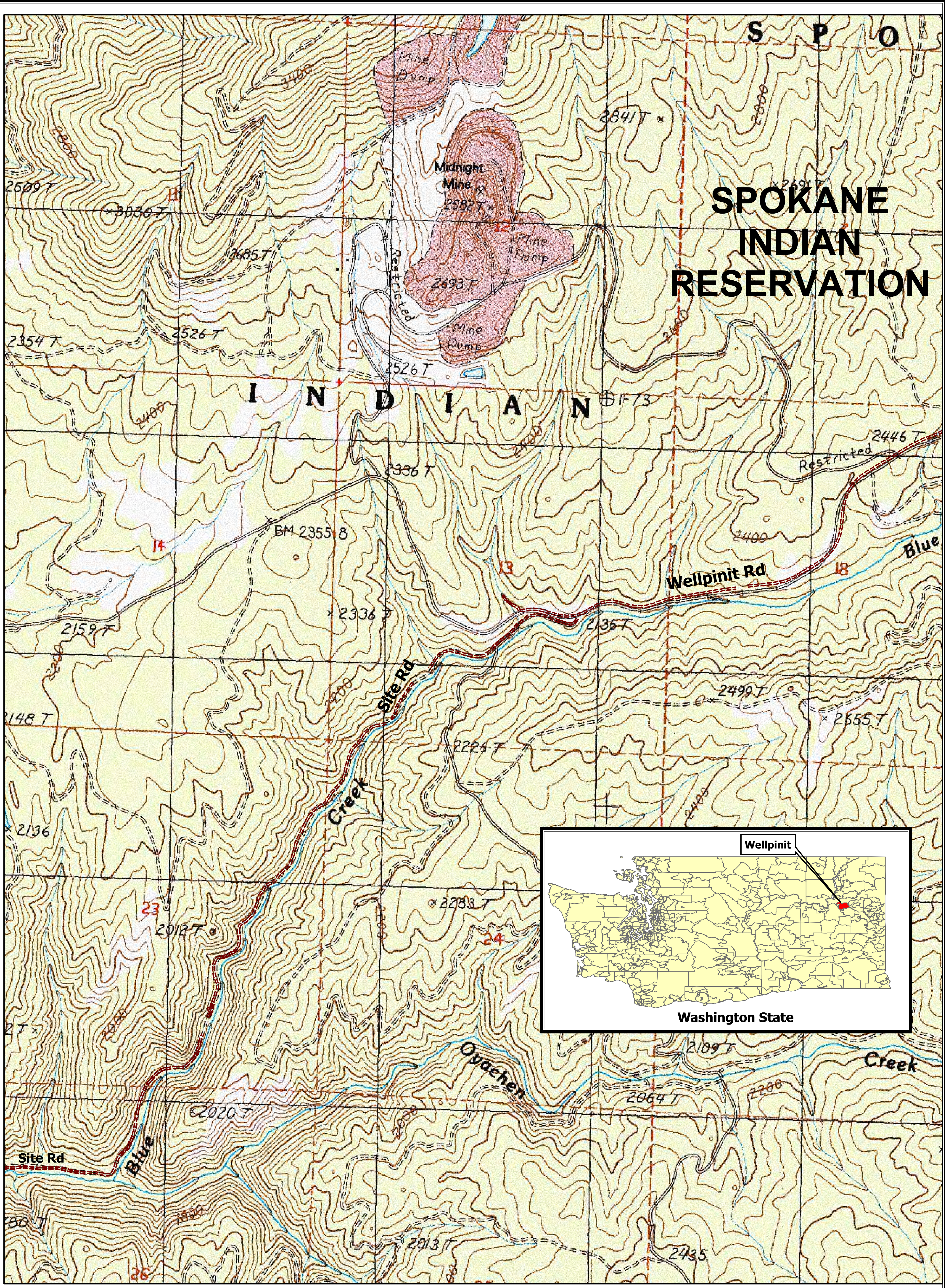
nb = no benchmark
> = greater than
< = less than
BM<ND = Benchmark value less than non detected value

- HQ<1 (Analyte not being retained)

- BM<ND or No Benchmark

- HQ of 1.0 to 9.9

- HQ>10.0



Map created using USGS DRG and DRQ data.
Site survey GPS data also utilized for sample locations.
GPS data collected in Lat, Lon. Decimal Degrees, WGS84.
Map Projection: UTM, Zone 11M
Datum: NAD83
Units: Meters

LEGEND

- PAVED ROAD
- UNPAVED ROAD
- CREEK LINE

0 300 600 Meters

N W E S

Data: g:/ArcViewProjects\REAC3/266
.mxd file: g:\ArcInfoProjects\Reac4\EAC400081_MidniteMine
FIG: EAC00081_SiteMap_f1

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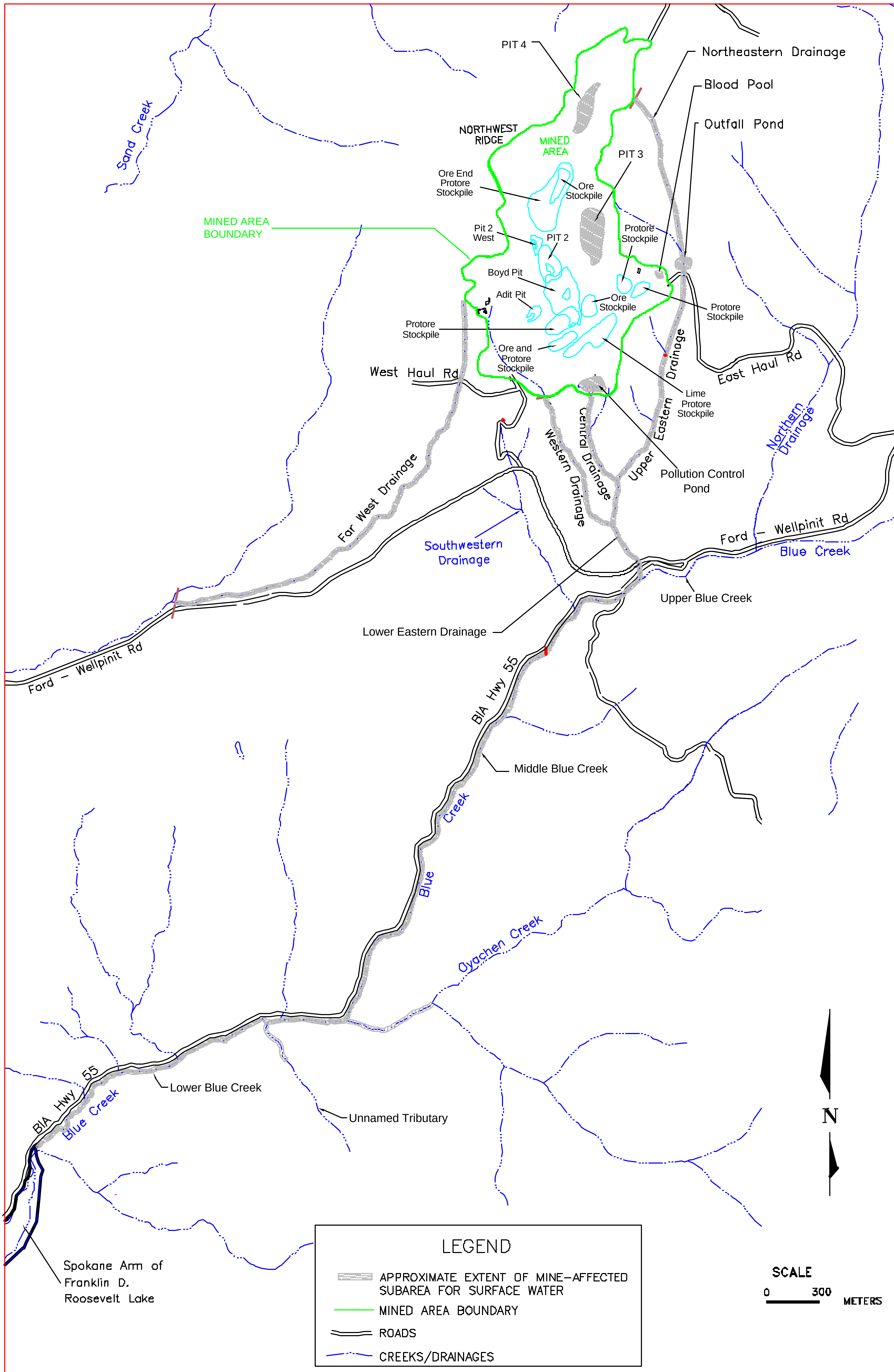
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C-04-032
W.A. # 0-081

FIGURE 1
SITE MAP
MIDNITE MINE SITE
WELLPINIT, WA



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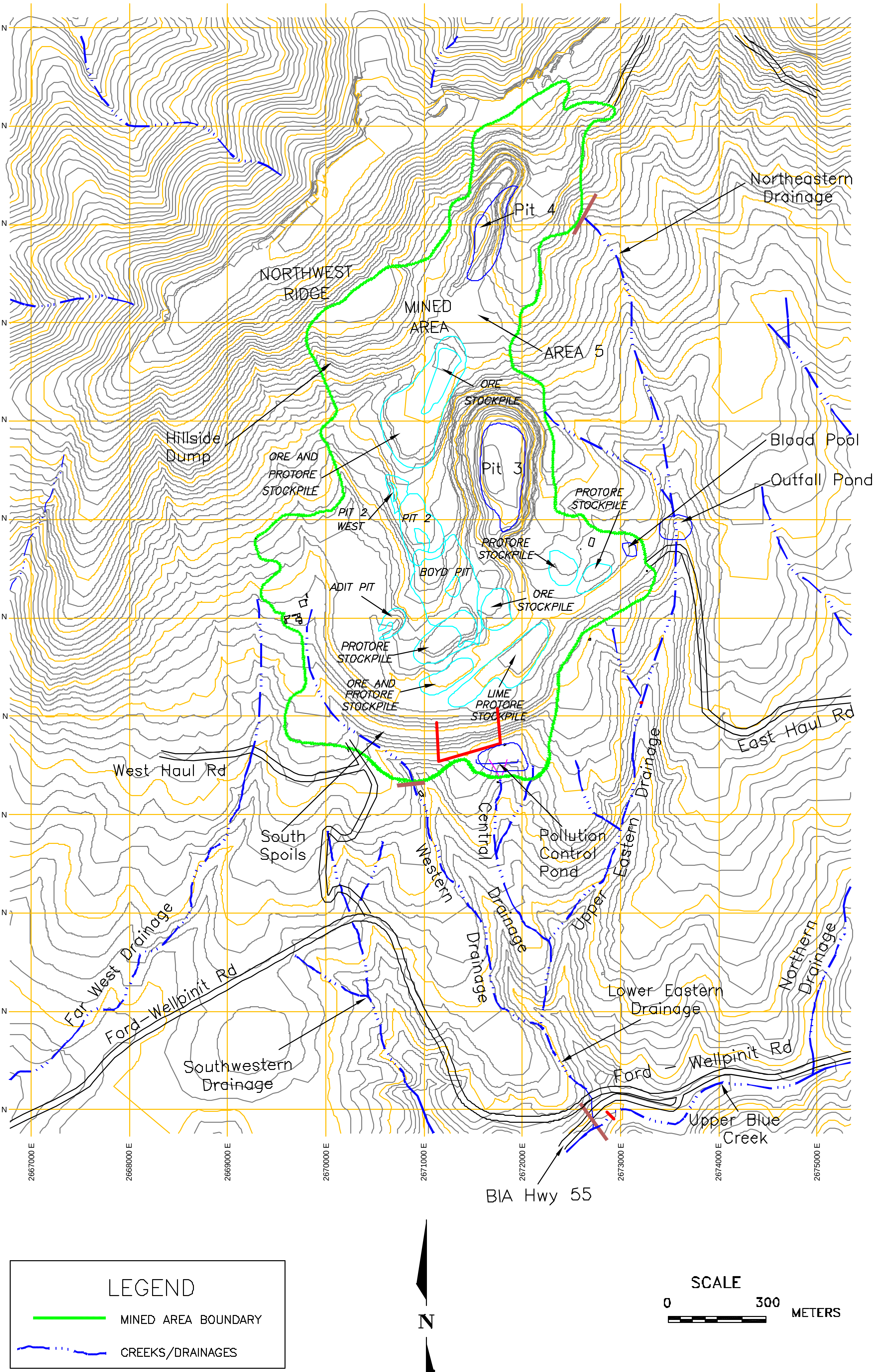
68-C99-223
W.O.# R1A00266

FIGURE 2
SITE MAP
MIDNITE MINE SITE
WELLPINIT, WA

00-266/M4001043_N.DWG



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68-C99-223
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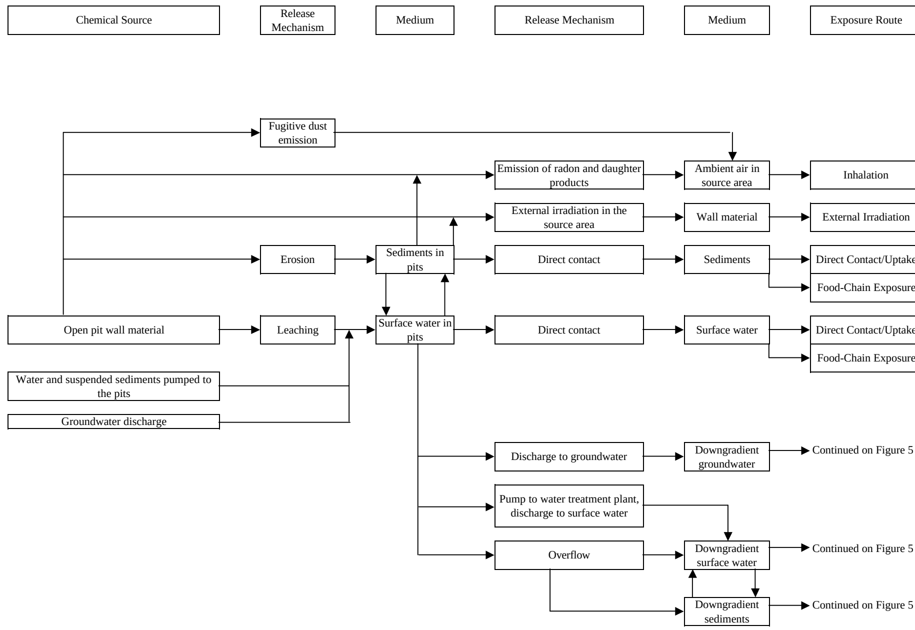
FIGURE 3
MINED AREA AND DRAINAGES
MIDNITE MINE SITE
WELLPINIT, WA

OD-266/map_topo.dwg

Figure 4. Conceptual Site Model - Surface Water and Sediments of Open Pits in the Mined Area[1]
Midnite Mine Site
Wellpinit, WA

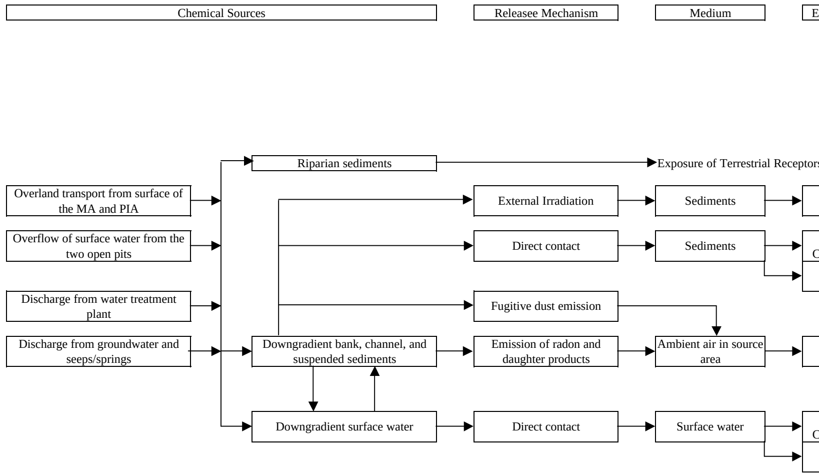


Exposure Route	Terrestrial Receptors – Terrestrial Ecosystem – Producers: Upland Vegetation	Riparian/ Wetland Vegetation	Detritivores: Soil Biota	Consumers: Herbivores	Invertivores	Carnivores	Aquatic Ecosystem: Piscivores	Aquatic Receptors – Aquatic Ecosystem – Producers: Aquatic Vegetation	Consumers: Invertebrates	Fish	Amphibians
Inhalation	-	-	-	*	*	*	*	-	-	-	-
External Irradiation	-	o	-	o	o	o	o	*	*	*	*
Direct Contact/Uptake	-	o	-	o	o	o	o	o	o	o	o
Food-Chain Exposure	-	-	-	o	o	o	o	-	-	o	o
Direct Contact/Uptake	-	o	-	o	o	o	o	o	o	o	o
Food-Chain Exposure	-	-	-	-	-	-	o	-	-	o	o

-	Pathway not complete or applicable, no evaluation necessary.
*	Pathway is or may be complete; however, risk is likely low.
o	Pathway is complete and risk may be significant.

1 - Adapted from URS(2001b).

Figure 5. Conceptual Site Model - Surface Water, Instream Sediments, and Riparian Sediments in the Potentially Impacted Area[1]
Midnite Mine Site
Wellpinit, WA

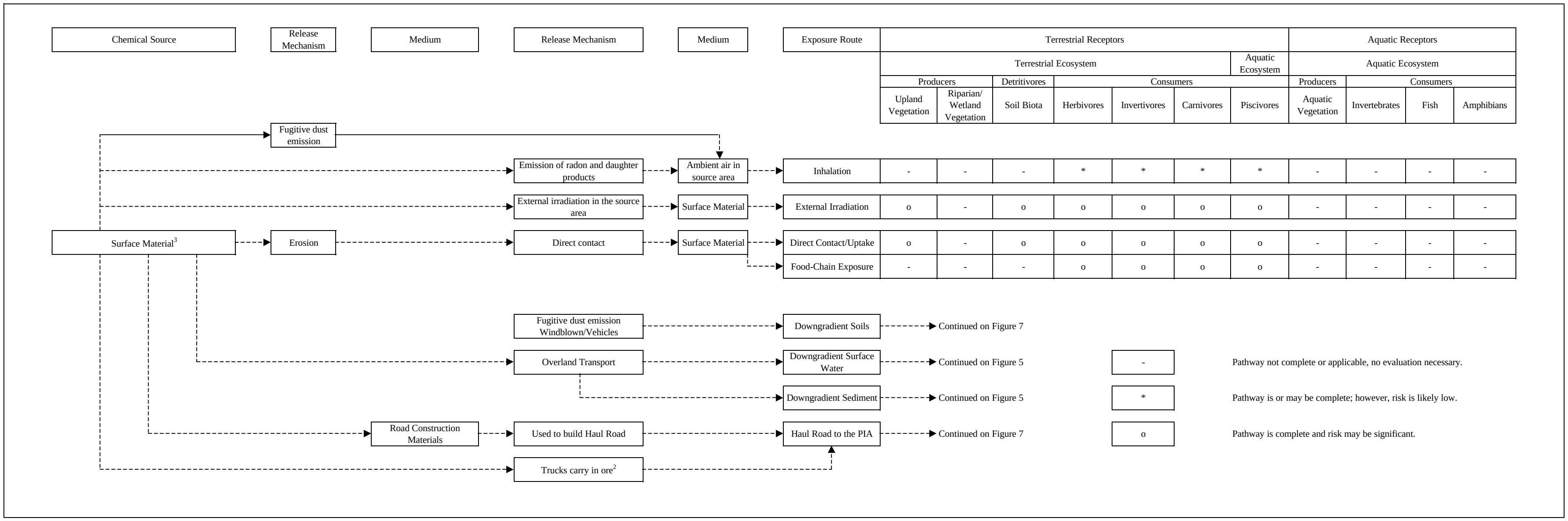


Exposure Route	Terrestrial Receptors							Aquatic Receptors			
	Terrestrial Ecosystem						Aquatic Ecosystems	Aquatic Ecostystem			
	Producers		Detritivores	Consumers				Producers	Consumers		
	Upland Vegetation	Riparian/ Wetland Vegetation	Soil Biota	Herbivores	Invertivores	Carnivores	Piscivores	Aquatic Vegetation	Invertebrates	Fish	Amphibians
External Irradiation	-	*	-	*	*	*	*	*	*	*	*
Direct Contact/Uptake	-	o	-	*	*	*	*	o	o	o	o
Food-Chain Exposure	-	-	-	-	-	-	o	-	-	o	o
Inhalation	-	-	-	*	*	*	*	-	-	-	-
Direct Contact/Uptake	-	o		*	*	*	*	o	o	o	o
Food-Chain Exposure	-	-	-	*	*	*	o	-	-	o	o

-	Pathway not complete or applicable, no evaluation necessary.
*	Pathway is or may be complete; however, risk is likely low.
o	Pathway is complete and risk may be significant

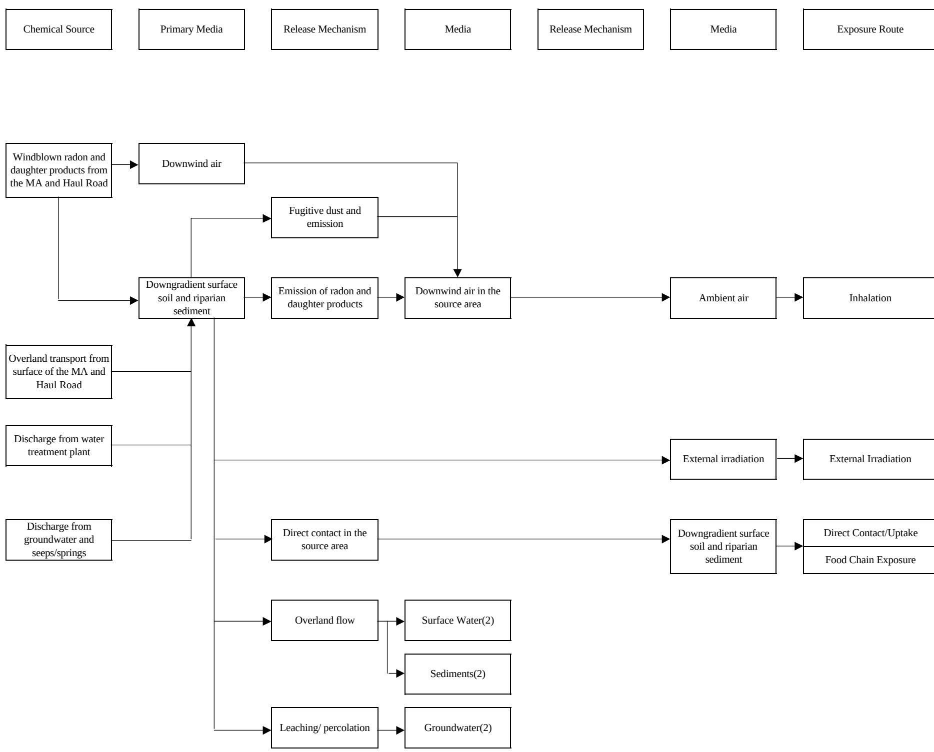
1 - Adapted from URS(2001b).

Figure 6. Conceptual Site Model - Surface Material Sources in the Mined Area [1]
Midnite Mine Site
Wellpinit, WA



1 - Adapted from URS(2001b).
2 - The Haul Roads may have been impacted by ore lost from trucks during the mining operations.
3 - Surface materials and soils used interchangeably in this ERA.

Figure 7. Soils and Riparian Sediments in the Potentially Impacted Area[1]
Midnite Mines Site
Wellpinit, WA

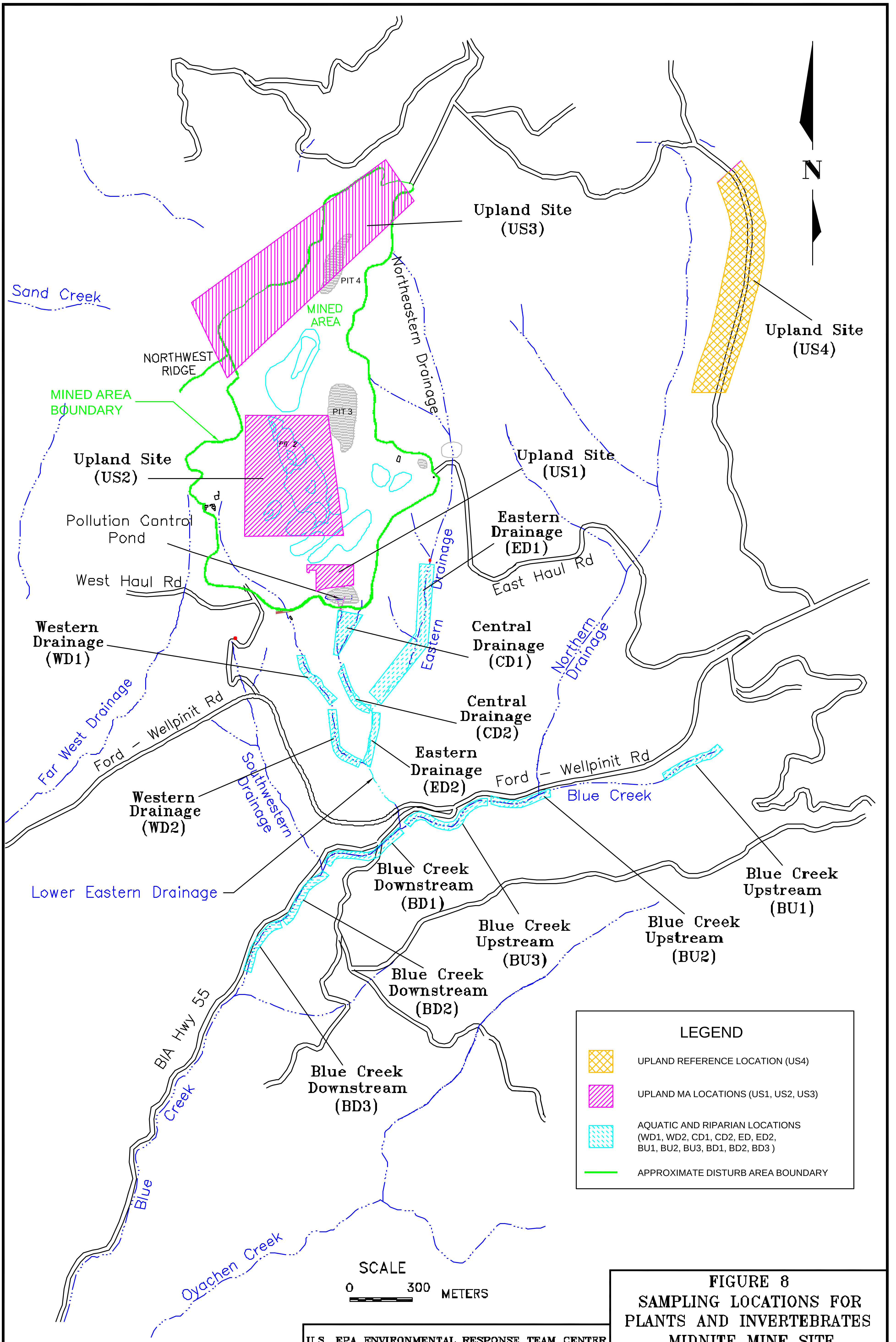


Receptors

	Terrestrial and Riparian Receptors							Aquatic Receptors			
	Terrestrial Ecosystem						Aquatic Ecosystem	Aquatic Ecosystem			
	Producers		Detritivores	Consumers				Producers	Consumers		
Exposure Route	Upland Vegetation	Riparian/ Wetland Vegetation	Soil Biota	Herbivores	Invertivores	Carnivores	Piscivores	Aquatic Vegetation	Invertebrates	Fish	Amphibians
Inhalation	o	o	o	o	o	o	o	-	-	-	-
External Irradiation	o	o	o	o	o	o	o	-	-	-	-
Direct Contact/Uptake	o	o	o	o	o	o	o	-	-	-	-
Food Chain Exposure	-	-	-	o	o	o	o	-	-	-	-

-	Pathway not complete or applicable, no evaluation necassary
*	Pathway is or may be complete; however, risk is likely low
o	Pathway is complete and risk may be significant

1 - Adapted from URS(2001b).
2 - Pathway may be minor due to small volume of source.



ADAPTED FROM SMI (1999 b)

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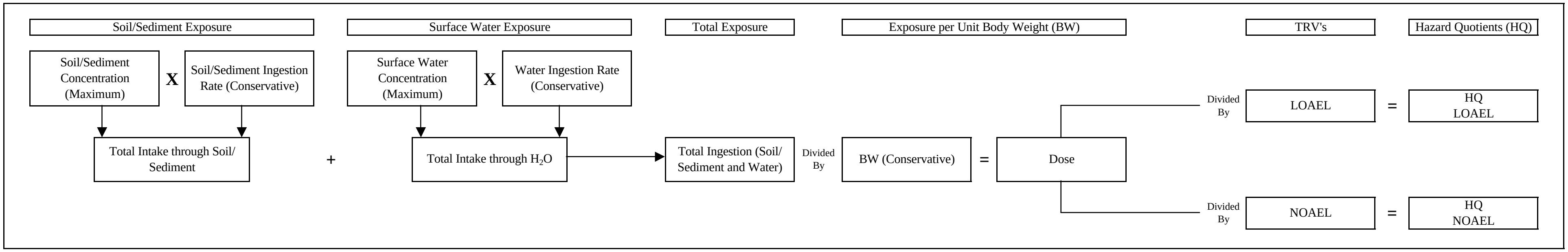
W.O.# R1A00266

FIGURE 8
SAMPLING LOCATIONS FOR PLANTS AND INVERTEBRATES
MIDNITE MINE SITE
WELLPINIT, WA

266/266_FIG8.DWG 10/17/03

Figure 9. Model 1: Exposure Model Using Conservative Life History Parameters to Estimate Risk From Contaminants via Soil/Sediment and Surface Water Ingestion
Midnite Mine Site
Wellpinit, WA



BW = body weight

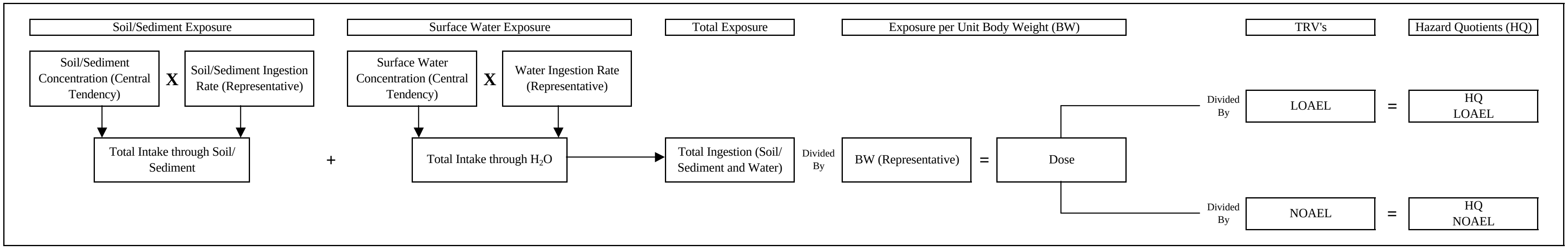
TRV = toxicity reference value

LOAEL = lowest observed adverse effect level

HQ = hazard quotient

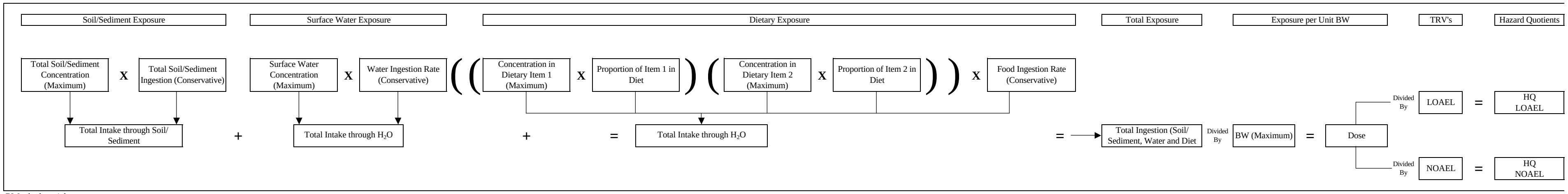
NOAEL = no observed adverse effect level

Figure 10. Model 2: Exposure Model Using Representative Life History Parameters to Estimate Risk From Contaminants via Soil/Sediment and Surface Water Ingestion
Midnite Mine Site
Wellpinit, WA



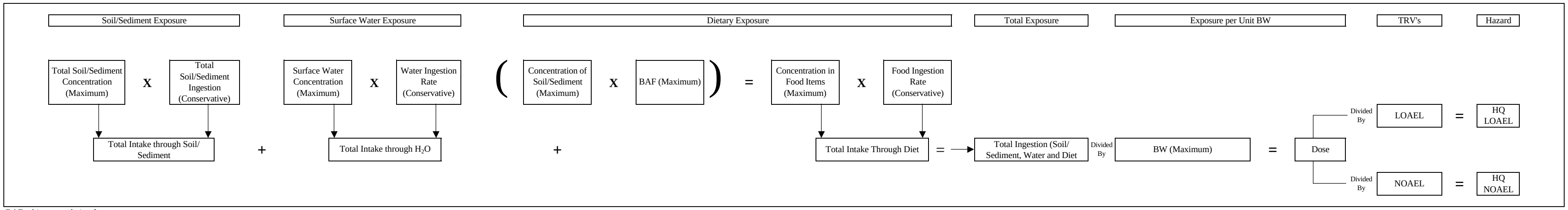
BW = body weight
TRV = toxicity reference value
LOAEL = lowest observed adverse effect level
HQ = hazard quotient
NOAEL = no observed adverse effect level

Figure 11. Model 3a: Exposure Model using Conservative Life History Parameters and Site Specific Tissue Concentrations of Food Sources to Estimate Risk via Soil/Sediment, Water and Dietary Intake
Midnite Mine Site
Wellpinit, WA



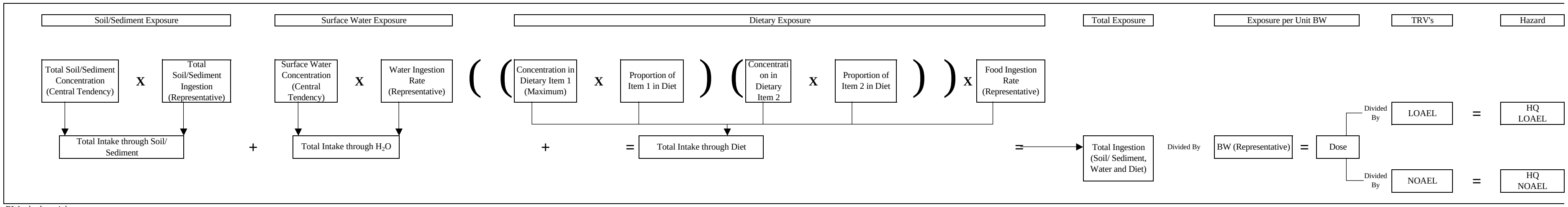
BW = body weight
TRV = toxicity reference value
LOAEL = lowest observed adverse effect level
HQ = hazard quotient
NOAEL = no observed adverse effect level

Figure 12. Model 3b: Exposure Model using Conservative Life History Parameters and Bioaccumulation Factors (BAFs) to Estimate Risk From Contaminants for Piscivores, Soil Feeding Invertebrates, and Carnivores via Soil/Sediment, Water, and Dietary Intake
Midnite Mine Site
Wellpinit, WA



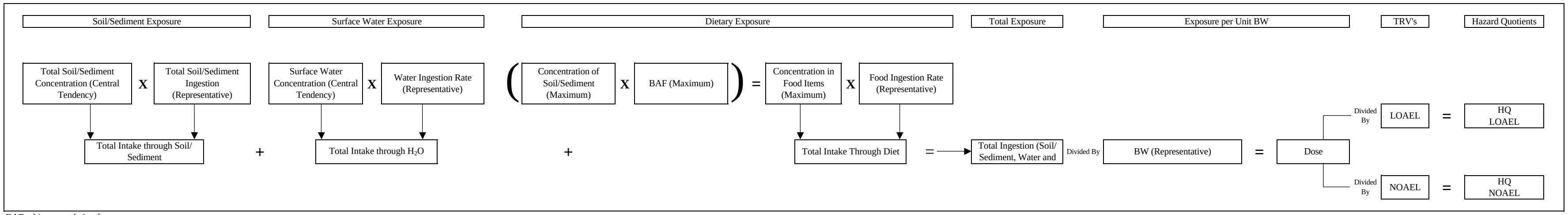
BAF = bioaccumulation factor
BW = body weight
TRV = toxicity reference value
LOAEL = lowest observed adverse effect level
HQ = hazard quotient
NOAEL = no observed adverse effect level

Figure 13. Model 4a: Exposure Model using Representative Life History Parameters and Site Specific Tissue Concentrations of Food Sources to Estimate Risk via Soil/Sediment, Water and Dietary Intake
Midnite Mine Site
Wellpinit, WA



BW = body weight
TRV = toxicity reference value
LOAEL = lowest observed adverse effect level
HQ = hazard quotient
NOAEL = no observed adverse effect level

Figure 14. Model 4b: Exposure Model using Representative Life History Parameters and Bioaccumulation Factors (BAFs) to Estimate Risk From Contaminants for Piscivores, Soil Feeding Invertebrates, and Carnivores via Soil/Sediment, Water, and Dietary Intake
Midnite Mine Site
Wellpinit, WA



BAF = bioaccumulation factor
BW = body weight
TRV = toxicity reference value
LOAEL = lowest observed adverse effect level
HQ = hazard quotient
NOAEL = no observed adverse effect level

APPENDICES

Appendix A - BTAG Response Memorandum
Midnite Mine Site
Wellpinit, Washington

This memorandum serves to respond to the comments and inquiries presented in the following three memorandums:

1) Memorandum from the Spokane Tribe of Indians/AESE, Inc; Dated May 7, 2003; Subject: Review of Draft Life Histories.

2) Memorandum from the Spokane Tribe of Indians/AESE, Inc; Dated May 7, 2003; Subject: Review of Toxicity Reference Values (TRV's) for Mammals and Birds.

3) Memorandum from U.S. Fish and Wildlife Service; Dated May 21, 2003; Subject: Comments on Toxicity Reference Values and Life History Profiles for the Midnite Mine Ecological Risk Assessment.

All of the comments and/or inquiries presented in each of these memorandums is provided below followed by a response for each comment or inquiry.

Memorandum from the Spokane Tribe of Indians/AESE, Inc; Dated May 7, 2003; Subject: Review of Draft Life Histories.

Inquiry #1:

General Concerns:

1. The Tribe is still concerned with all issues described in our previous comments (e.g., see October 22, 2001 Comments from the Tribal members of the MUM BTAG).

Many of such concerns center around uncertainties associated with BERA. Concerns pertinent to this review and the ultimate BERA are echoed once again below:

I. Spatial Concerns

1. Exposure Point Concentrations (EPCs)
    a. How do they represent an area or volume of media (i.e., spatial representation of COCs within an exposure area)
    b. Bioavailability of measured COCs
    c. Effective concentration (bioavailability) and grain size

2. Definition of exposure areas (EAs)
    a. Each receptor has a separate home-range (i.e., spatially different) and therefore encounters different effective concentrations of COCs in their EA.
    b. Each receptor spends different amounts of time, doing different things (eating, drinking, dusting, etc.) in different portions of their home-range (which

is a mosaic of different EAs containing different effective concentrations in different media). Therefore exposure frequency and ultimate dose are not straight-forward. This is especially concerning in instances where conditions could be considered an attractive nuisance, such as salts deposited in association with the mine.

II. Exposure Factors Concerns

1. Transfer coefficients from media to dietary components (soil to plant)

2. Bioavailability of measured COCs

3. Effective concentration (bioavailability) and grain size

4. Pathways
   a. Diet (+ incidental ingestion)
   b. Water
   c. Ingestion (neglected)
   d. Dermal (neglected)

5. Consumption rates and body weights
   a. Sometimes based on surrogates (unverified allometric relationships)
   b. Sometimes based on small, statistically insignificant studies (small "n")
   c. Makes assumptions regarding resident species

6. Does not account for multi-pathway, multi-media, multi-COCS exposures

III. TRV determination

1. Inconsistent safety Factors (if any) used to determine NOAEL from LOAEL

2. Laboratory extrapolation to Field concerns
   a. assimilation efficiency adjustments? (metabolic rates rarely recorded in field/Lab)

3. Inconsistent measurement attribute (for dose response curve)
   a. Morbidity
   b. Organ-specific damage
   c. DNA damage
   d. Growth
   e. Population shifts from changes due to selection

4. Applicability of referenced studies to Midnite.

Response to Inquiry #1:

The issues raised in these comments regarding spatial issues, exposure factors, and TRV determinations are recognized as valid concerns. Within the ERA process we are attempting to either resolve each of these issues, or at least acknowledge the issue as an uncertainty within the assessment. Some specific responses are attempted here:

1) Spatial Concerns

Exposure Point Concentrations (EPC) are initially based on maximum detection values for each COPC for all of the designated site locations in the mined and PIA areas for each type of media (soil, sediments, and surface water). The exposure areas have been defined based on the designated locations where samples were collected for analysis. For example, the PIA has two deignated areas, Northeast and Southwest areas, where soils have been collected . Both areas will be assessed individually using the dietary models.

The first run of the dietary models will be performed based on conservative life history profiles that would include applying the lowest reported body weight, maximum exposure concentrations, maximum ingestion rates (food, water, and soil), a single food item, and an area use factor (AUF) of one. An AUF of one implies that the receptor spends 100 % of its time and obtains 100% of its food within each location of the PIA and/or mined area. It should be noted that if actual home ranges are applied for many of the receptors, the AUF would be less than one and would tend to dilute the exposure and subsequent risk. Contaminants in food items will be assumed to exhibit 100% absorption efficiency (i.e. 100% bioavailable) plus it will be assumed that the contaminants will not be metabolized or excreted during the life of the receptor. This first run using the dietary models with these conservative assumptions often aids in minimizing the possibility of concluding that no risk is present when a threat may actually exist. A practical outcome of this set of calculations is that if an exposure scenario indicates that the hazard quotient (HQ) is less than 1, there is a high degree of confidence (from EPAs perspective) that the assessment endpoint is not at risk from that contaminant. Alternately, if the HQ is equal to or greater than one, we do not have a high degree of confidence that a risk does exist, and therefore further evaluation should be considered.

Following the more conservative dietary modeling as described above, subsequent dietary models will be run using mean or median exposure point concentrations and representative life history profiles values. However, the AUF of one will be retained for the subsequent models. These less conservative runs often serve to derive what particular COPCs are driving the risks, the relative magnitude of risks between locations, which part of the exposure term drives the *risk (e.g. soil ingestion or food ingestion) and what assessment endpoints are at the greatest risk. This is effectively a rudimentary sensitivity analysis.*

It is expected that the attractive nuisance of certain habitats, such as the water sources and the salts deposited within the mine area being used by various organisms (i.e. deer and elk) along with the type of habitat that may attract certain types of organisms to reside within the mine area (i.e. marmots, cliff swallow) would impose significant risk. Areas which may represent an attractive nuisance should be evident from the models described above primarily from the high concentrations of COPC at these areas. In addition, the risk characterization phase of this ERA will emphasize the risks imposed by attractive nuisances at the Midnite Mine site.

2) Exposure Factor Concerns

As noted above, we are at least initially assuming that the bioavailable fraction of the measured total concentrations is 100%. At the same time we are not planning on modeling concentrations through the food chain, but we are anticipating only calculating exposure based upon site data.

It is true that the concentration of any element can be biased by the size fraction of the soil material collected, and that organisms can be selective in the ingestion of particular size fractions of soil or sediment. Unfortunately we do not have the data nor the life history information to do a credible job of further fractionation of the soil and sediment by particle size with a subsequent application in the exposure models. We will acknowledge this issue within the uncertainty section of the ERA.

With respect to the pathways we do not believe that we have neglected the ingestion pathway. We currently view diet exposure and ingestion exposure as the same. If we are misunderstanding the issue please inform us.

Dermal exposure is not currently within the exposure models. There is very little information on the dermal exposure pathway for wildlife. Without enough information we do not believe we can do a credible job of including this exposure pathway, however, we will acknowledge this issue in the uncertainty section.

With respect to the consumption rates and body weights we can again acknowledge that there is uncertainty in these estimates. However, we are using the best information available, and will continue to add to this as other information becomes available.

We have simplified the exposure pathways (not multiple forage items) however, we believe we have selected a dietary exposure item which should not underestimate the potential exposure from that route. That is, we do not have data on any other potential food item that has a high *contaminant concentration; so by adding complexity we would anticipate that the exposure estimate would decrease, not increase.*

As to multiple COC exposures, we acknowledge the issue of cumulative stress, however we do not believe we can defend the summing of different contaminant exposure levels if we do not know that the contaminants have the same mechanism of toxicity. We will sum uranium and cadmium HQs, as they do both have the kidney as the target organ.

3) TRV determination

We apply a rather strict definition to what we are calling safety factors, uncertainty factors and conversion factors. We are classifying safety factors and uncertainty factors as those values applied in instances where we believe we need to adjust our calculations to be more conservative in the absence of information. Conversion factors are values applied to estimate a new (unavailable) value from existing values. Within the materials provided to date, we have not used safety factors or uncertainty factors directly. They may be part of one of the studies we have used, but we did not apply the factor. What we have done is convert toxicological threshold estimates by applying our criteria for the use of conversion factors (e.g. converting LOEAL to NOAELs). Please review our response to Inquiries 1 and 2 of the US Fish and Wildlife Memorandum for further explanation.

Our justification for not applying safety /uncertainty factors is that the primary function of a Superfund ERA is to generate information for the project managers such that they can make informed management decisions. The application of safety/uncertainty factors does not inherently create better information for management decision. That is, increasing a HQ through the application of a safety factor does not necessarily create more sound decisions. From an empirical standpoint, it has been our observation that the application of several safety/uncertainty factors in risk assessments frequently results in conservative assessments, but ones which have impractical answers and for elements which are essential it is possible to conclude that the chemical levels meant to protect organisms will lead to deficiencies.

Our TRV determinations are primarily based on survival, growth impairment, or reproductive effects, which consider measurement endpoints that can be directly related to discernible ecological effects. Other studies that have evaluated effects using other measurements are reviewed and may be incorporated into the report, but there is often legitimate debate as to how these measures relate to a toxicological response in the field. We welcome factual and informed challenges to our evaluation of the literature, as this should improve our evaluations.

It is recognized that laboratory extrapolation to field conditions presents a significant level of uncertainty. We will acknowledge this within the uncertainty section of the ERA. We believe we *have taken an objective approach to the use of the existing information and have been transparent as to our process.*

As to the measurement attributes selected for the TRV development, we have taken the approach that the mechanism of toxicity of the contaminant and the specific studies conducted dictate the attribute measured. For the evaluation of risk, we have strived for this to be founded in a response which is relevant to the organism in the field, not based upon short term exposures or mortality. This is not to say that short term exposures or mortality responses should be discounted; they may be excellent parameters in identifying areas which are critical from a risk management prospective.

With respect to the "applicability" of references to Midnite mine, we have tried to communicate the origin of all of our literature-based information such that it can be reviewed. We have adjusted exposure parameters, based upon comments provided, as well as the TRVs. We believe that we can state that most, if not all, adjustments have been made to make the resulting risk characterization more conservative rather than more site specific.

Inquiry #2:

2. The following statement, which is found throughout the text, is not necessarily correct:

> *"Representative exposure parameters are either the average or the midpoint of the range of values located for this species, as indicated below."*

It is quite likely that only the species at either the high or low-end of the distribution are truly present at the site (or would likely be present, but for the contamination). Until a survey has been completed for the MUM and an appropriate reference area, we strongly recommend the use of conservative physical parameters and conservative exposure factors.

Response to Inquiry #2:

The values considered to be representative exposure parameters are intended to provide an overall representation of a particular species derived from studies presented in published literature. These exposure parameters are not intended to be representative of the species or communities at the site per se. Both conservative and representative exposure parameters are provided for each receptor. This approach serves to offer a range of exposure profile criteria that can be used to evaluate risk of the COCs from conservative to more representative criteria. It is the intention of this ERA to model risk using both conservative and representative criteria.

Inquiry #3:

3. The life histories do not appear to cover all of the receptors developed previously by the BTAG (see October 22, 2001 Comments from the Tribal members of the MUM BTAG on: (1) "Aquatic Ecological Risk Screening for the Midnite Mine RI/FS, Draft Technical Memorandum, URS August 2001", and (2) "Terrestrial Ecological Risk Approach for the Midnite RI/FS, Draft Technical Memorandum, URS October 2001)

> The narrative for the receptors is nice, but some receptors appear to differ from the list. Note, that EPA agreed to at least addressing each pathway requested to be evaluated by the Tribe via a foot note. For example, if EPA is not assessing the risk from the inhalation pathway for a given set of receptors, then EPA should state the rationale for not doing so in the matrix via footnote.

Response to Inquiry #3:

Meadow vole, white-tail deer, masked shrew, bobcat, ruffed grouse, cliff swallow, American robin, great horned owl, muskrat, racoon, mink, mallard, common snipe, great blue heron, bald eagle, and spotted frog were the receptors listed in the "Terrestrial Ecological Risk Approach for the Midnite RI/FS, Draft Technical Memorandum", URS October 2001. In addition, the aquatic receptors listed in "Aquatic Ecological Risk Screening for the Midnite Mine RI/FS, Draft Technical Memorandum, URS August 2001" included salmonid fisheries, benthic macroinvertebrate commiunity, and aquatic plants.

All of these receptors will be included in the ERA with the exception of the ruffed grouse. It was decided to replace the ruffed grouse with the the Spruce grouse as being a more representative species for this site. The spotted frog will be incorporated within the "Viability and Function of the Amphibian Community" assessment endpoint. In addition, four other receptors (coyote, deer mouse, American kestrel, and song sparrow) will be included in the ERA based upon BTAG conference call discussions.

All potential exposure pathways will be defined within the conceptual model of the ERA. If certain pathways (i.e. inhalation) are not included in the assessment or models, a rationale for the exclusion will be provided.

4. While reviewing some of the supporting literature, it became apparent that the authors were not relying on the references, nor are they necessarily disclosing all of the information developed during the studies. For example, the authors state:

> “The water ingestion rate for the white-tailed deer is reported to be 3.61 L/day (Later, et al. 1988)”.

However, upon review of this work, it appears that: (1) the statement is based on a study of nine animals in captivity and (2) the reported rate is an average for the nine animals over a period in which ingestion rates of roughly 1.4 and 13.5 L/day were observed. This means that a conservative ingestion rate of liquids would be near the higher end of the distribution - not the mean.

Response to Inquiry #4:

Based on this and similar comments from the U.S. Fish and Wildlife Service, a conservative water ingestion rate of 13.5 L/day (Lautier et al. 1988) has been included in the exposure profile of the white-tailed deer. While we are including this water ingestion rate, we do not feel that it is truly representative; this high water ingestion rate was measured in a much hotter and drier environment (southern Texas) than the Midnite Mine area, and therefore would be considered a highly conservative estimate.

Inquiry #5:

5. It would also be useful to develop a table of exposure factors. Such a table should include the pertinent parameters, and associated summary statistics such as number of samples, mean, standard deviation, and the range of the reported literature values.

Also, it appears that much work has been expended compiling all of the reference materials and generating the life histories. However, many of the references have not been obtained or reviewed at this time. The Tribe also does not have all of these references. In order to conserve resources and reduce the duplication of efforts, the Tribes requests that EPA provide one copy of all of the references. Preferably, this can be transmitted via CD-ROM.

Response to Inquiry #5:

We agree that a table of exposure factors as described would be valuable. However, at the current time, we do not have the resources to produce this.

While we would like to provide copies of the references used to develop the TRVs and/or life history profiles, it is impractical to do so. The volume of materials involved is substantial, on the order of thousands of pages. These documents are not available on CD-ROM and would have to be scanned individually into PDF files to put them in an electronic format, which is an enormous task. Additionally, there are copyright issues that would need to be addressed. However, if there are a few specific publications that you would like to review, we could make arrangements to *process copies for you. It should be noted that these TRVs and life history profiles are being generated for a more universal use to support Super Fund risk assessments.*

Specific Concern #1:

Specific Concerns:

1. Meadow vole (*Microtus pennsylvanicus*)

> "A food ingestion rate for the meadow vole could not be found. Therefore the ingestion rate of a closely related species, the prairie vole (M. ochrogaster) was used to calculate ingestion rates for the meadow vole."

The following two reference citations contain food ingestion rates for the meadow vole that are higher than that used in the "conservative estimates" of the life histories document:

> a. Nagy KA (2001) Food requirements of wild animals predictive equations for free living mammals, reptiles, and birds. Nutrition Abstracts and Reviews, Series B71, 21R-31R.
>
> b. Wildlife Exposures Handbook vol. I EPA/600/R-93/187 December 1993.

Response to Specific Concern #1:

General comment about use of the suggested references:

Whenever possible, measured, species-specific ingestion rates (food, water, and soil) from field populations have been used to develop exposure profiles. If species- specific field data is not available, species-specific rates derived from laboratory studies of the receptor of interest would be preferred. When a species-specific rate could not be found, a published ingestion rate for a closely related species was used, followed by allometric equations derived by Nagy (1987) and Calder and Braun (1983). Allometric equations provide only predictive estimations inferring a relationship based on a review of a wide range of species and, we believe, are less likely to accurately express species-specific ingestion rates than are empirically derived measures.

We have included the Nagy KA(2001) reference for several profiles (cliff swallow and spruce grouse), but did not use it for the meadow vole since we used species specific data for that receptor.

U.S. EPA 1993a,b: The information contained in these documents was compiled from other sources. Thus, while U.S. EPA documents were used to locate literature sources containing information used in the life history profiles, they are not cited when they are not the original *source of the information. In addition, in some cases, the information contained in U.S. EPA (1993a,b) was found to be incorrect or modified from the original source [e.g., one ingestion rate cited by U.S. EPA 1993a,b as being for meadow voles is actually an intake rate for herbivores, not specifically meadow voles (Ognev 1950 ,as cited by Johnson and Johnson 1982)]. Finally, intake rates presented in units of amount per day were preferred for use in the life histories over those given on a per unit body weight per day basis, as the food-chain models already incorporate body weights. If a document provided both intake rates on a per unit body weight per day basis and body weights of species, the intake rates in amount per day could be calculated, but in some instances, documents cited in U.S. EPA (1993a,b) were not used because such information was not available.*

Regarding the food ingestion rate for the meadow vole specifically, this section of the life history has been revised. Several documents providing species-specific ingestion rates were found and have been incorporated into the life history profile. The paragraph describing derivation of food ingestion rates for the meadow vole is provided below:

> "The food ingestion rates of non-breeding adult meadow voles eating a diet of mouse chow were reported to be between 4.82 and 5.93 g/day (Innes and Millar 1981; Dark et al. 1983). The food ingestion rates of meadow voles eating a powdered synthetic diet, a powdered corn-based diet, and a powdered sorghum-based diet were 4.61, 4.75, and 6.5 g/day, respectively (Williams et al. 1978). However, ingestion rates based on relatively dry diets such as these may underestimate the amount of fresh food an animal would consume (U.S. EPA 1993). In fact, ingestion rates may be twice or more as high, depending on the moisture content of the diet (French et al. 1955). The moisture content of the natural diet of the meadow vole is approximately 58%, based on the dietary composition presented above and the percent water in the various dietary components (U.S. EPA 1993). To estimate food ingestion of a natural diet, then, dry matter ingestion rates reported in the literature were adjusted as follows: WMI = DMI / (%DMC/100), where WMI = wet matter ingestion rate of a natural diet, DMI = reported dry matter ingestion rate of an experimental diet, and DMC = dry matter content of the natural diet. When ingestion rates of laboratory diets were not reported as dry matter ingestion rates, the wet matter ingestion rates were first converted to dry matter ingestion rates as follows: DMI = WMI x (DMC/100), assuming a water content of 10% (PMI Nutrition International 1996). The resulting dry matter ingestion rates were then converted to wet matter ingestion rates for a natural diet as described above. These calculations resulted in fresh food ingestion rates for the meadow vole ranging from 9.9 g/day to 14.1 g/day. The highest ingestion rate was used as a conservative estimate of food ingestion; the average ingestion rate (12 g/d) was used as a representative estimate of food ingestion."

Specific Concern #2:

2. EXPOSURE PROFILE OF THE MEADOW VOLE (*Microtus pennsylvanicus*); Paragraph 5:

> "The water ingestion rate for the meadow vole is reported to be 0.21 ml/g BW/day (Ernst 1968, as cited by Reich 1981)..."

Please explain why a water ingestion rate is available whereas a dietary solids ingestion rate is not available in the literature.

Response to Specific Concern #2:

Because species-specific food ingestion rates have been found and incorporated into the life history profile of the meadow vole, we feel that this comment is addressed..

Specific Concern #3:

3. LIFE HISTORY OF THE COYOTE (*Canis latrans*):

The Coyote is omnivorous. Please refresh our memory as to why the Coyote is being "modeled" as a carnivore.

Response to Specific Concern #3:

The coyote is an opportunistic omnivore and the literature suggests that they are primarily carnivorous, and only consume approximately 5% plant matter on the average. The coyote was selected to represent carnivorous mammal community along with the bobcat and masked shrew. The masked shrew is primarily an insectivore and thus presents a different diet and exposure as a carnivore than the coyote or bobcat. Additionally, we believe that the inclusion of the plant portion of their diet would create a less conservative exposure model.

Memorandum from the Spokane Tribe of Indians/AESE, Inc; Dated May 7, 2003; Subject: Review of Toxicity Reference Values (TRV's) for Mammals and Birds.

Inquiry #1:

General Concerns:

1. NOAELs and LOAELs are not available for each pathway (i.e., direct ingestion, incidental ingestion, inhalation, or dermal) for each ecological receptor. Exposure factors also are not available for "representative" or sentinel receptors. Therefore, the BERA is reduced, in many instances, to relying on *modeled* pathway-specific *doses* to *modeled* receptors. Finally, because knowledge of *responses* to such doses suffer from the same shortcomings, these *modeled doses* are ultimately compared to *modeled response* with the inability to ever verify the results of either modeling event.

From this discussion, it is clear that even though EPA has "applied this type of approach at all of its sites", the uncertainty associated with this approach is monumental and the potential to conclude that risk to a given receptor is minimal is quite high - - unless conservative values are used at every step of the modeling exercises. Upon review of the "TRV Summary Table", it became apparent that TRVs for the mammalian receptors are not necessarily "conservative". Below, we have compared NOAELs/LOAELs to another set employed by EPA's IRIS database. Most of which also were derived from studies using laboratory mice. Note that in most instances, the IRIS values are much lower, and therefore, should be employed as conservative NOAELs/LOAELs.

	ERTC Mammals		IRIS Mammals	
	NOAEL	LOAEL	NOAEL	LOAEL
	mg/kg/BW/day		mg/kg/BW/day	
Aluminum	1.93	19.3	0.43	
Antimony	0.062	0.62		0.35
Arsenic	1.91	9.63	0.0008	0.014
Barium	5.1	51	0.21	75
Beryllium	0.62	6.2		0.46
Cadmium	0.23	2.3	0.005	
Chromium	5.68	56.8		2.5
Cobalt	5	20	NA	NA
Copper	24.3	35.4	NA	NA
Iron	350	1000	NA	NA
Lead	8	80	NA	NA
Magnesium	5,542	12,308	NA	NA
Manganese	83	268		0.14
Mercury	0.032	0.16	NA	NA
Molybdenum	0.19	1.9		0.14
Nickel	23.1	42.1	5	50
Selenium	0.025	0.25	0.015	0.023
Silver	0.27	2.7		0.014
Thallium	0.074	0.74		0.25
Uranium	0.5	5		2.8

Vanadium	0.21	2.1		0.89
Zinc	22.5	225		1
NS- No Studies Available				

Also note that there are other sources of this information other than IRIS.

Response to Inquiry #1:

A comparison of the studies used for deriving both the IRIS TRVs and our TRVs is being provided below. It is noted that many of the IRIS TRVs are often based on biochemical, histopathologic, or epidemiological studies without a clear relationship to an anticipated adverse effect in wildlife. The basis for our TRVs is founded on reproduction, growth or mortality effects. It should also be recognized that an appropriate TRV value may not necessarily be the lowest value available. However, in many respects, the IRIS database is inclined to utilize the lowest value since it is imposing potential risk to humans as the receptors.

Aluminum

The IRIS TRV was derived from a 2-year feeding study with rats given diets containing aluminum phosphide at a concentration of 0.51 mg phosphine/kg food. No differences in blood chemistry, urine chemistry, or histologic parameters were observed in treated rats as compared to control rats. The IRIS review states that "the phosphide moiety contributes the most to the acute toxicity of this compound, ... therefore, it is appropriate to derive an RfD for aluminum phosphide based upon the RfD for phosphine". We conclude that this study is not appropriate for Al toxicity to wildlife, as the causative agent in the study appears to be the phosphide not the Al. Our TRV is based on an experiment where mice were administered aluminum chloride in drinking water at a concentration of 0 or 19.3 mg/kgBW/day for 3 generations. No significant differences between number of litters or offspring were observed. Significant growth retardation was observed in the second and third generation offspring.

Antimony

The IRIS TRV is based on the same study that our TRV is based on. We used body weight and water ingestion rates cited for Long-Evans strain rats in (U.S. EPA 1988); body weight of 0.43 *kg and a water ingestion rate of 0.053 L/day) to convert the exposure concentrations to units of mg/kgBWday (exposure concentration of 5 mg/L or 0.62 mg/kgBW/day). The IRIS review states "although not precisely stated, the concentration of 5 ppm antimony was expressed as an exposure of 0.35 mg/kg/day by the authors". No conversion factors are presented; the differences in our numbers result from the body weight and ingestion rate parameters used to convert the exposure concentrations to units of mg/kgBW/day. Without the documentation of how the dose of 0.35 mg/kg/day was generated we do not feel we can defend the use of that value for our purposes.*

Arsenic

The IRIS TRV is based on a study which evaluated the incidence of blackfoot disease, hyperpigmentation, and keratosis in two populations. Increased incidence of all three measured endpoints was observed with increasing age and dose. The arithmetic mean of the arsenic concentration in the wells used by the NOAEL group was 9 µg/L, and in wells of the LOAEL group is 170 µg/L. Arsenic concentration in food was assumed to be 2 µg/day. A water ingestion rate of 4.5 L/day and body weight of 55 kg were used to convert the exposure concentrations to units of mg/kgBW/day, resulting in a LOAEL of 14 µg/kgBW/day and a NOAEL of 0.8 µg/kgBW/day. We do not feel we can defend the use of these endpoints for ecological risk, because they are based upon pigmentation changes. While pigmentation can be important to wildlife, the relationship of these responses to impairment of wildlife is not clear.

Our TRV was derived from a study where mice were fed diets containing arsenic (as H_3AsO_4; 52.76% As) at concentrations of 0, 20, 100 or 500 mg/kg (arsenic concentrations of 0, 10.55, 52.76 and 263.8 mg/kg, respectively) for two generations (Hazelton Laboratories 1990). Exposure started 14 weeks premating for the first generation and continued through weaning of pups from the F_1 females. At the highest exposure concentration, lower birth weights, postnatal growth retardation and increased postnatal mortality were observed. Dam survival and weight gain were also affected at this exposure concentration. Growth of second generation males and females was significantly reduced at an exposure concentration of 100 mg/kg. With the exception of a few weeks (66 weeks of food consumption measurements, total), food consumption did not differ significantly between the 20 and 100 mg/kg exposure groups and control animals. Body weights of 31.9 g and 33.72 g, and food ingestion rates of 5.82 g/day and 6.11 g/day (reported for the 100 mg/kg and 20 mg/kg exposure groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. Based on the observed growth effects, a LOAEL of 9.63 mg/kgBW/day and a NOAEL of 1.91mg/kgBW/day were identified, and will be used to evaluate the risk posed by arsenic to mammalian receptors.

Barium

The IRIS TRV is based on the results of a controlled experiment and a retrospective epidemiology study to human volunteers. Barium was administered in drinking water to male volunteers at a concentration of 10 mg/L for 4 weeks at a daily dosage of 0.21 mg/kgBW/day (water consumption was 1.5 L/day, body weight assumed to be 70 kg). No barium was added for the first 2 weeks, which served as the control period. Systolic and diastolic blood pressures and blood chemistry parameters were not significantly affected by the barium exposure. Electrocardiograms revealed no changes in cardiac cycle intervals, and no significant arrhythmias, increases in ventricular irritability, or apparent conduction problems were seen with barium exposure.

In the epidemology study, barium concentrations in drinking water of two communities were 0.1 and 7.3 mg/L. No significant differences in mean systolic or diastolic blood pressures, rates of hypertension, heart disease, stroke, or kidney disease were found for men and women in the 2 communities. Using an assumed water ingestion rate of 2 L/day and body weight of 70 kg, a NOAEL of 0.21 mg/kgBW/day was calculated. This is in effect an unbounded NOAEL based upon human input parameters. The unbounded aspect suggests that "we know this much is ok but do not know how much more is ok", we do not know the LOAEL.

Our TRV is based on a study where rats were administered barium in drinking water at concentrations of 0, 1, 10 or 100 mg/L for 16 months. Rats exposed to 100 mg/L barium exhibited significant increases in systolic pressure, depressed rates of cardiac contraction, depressed electrical excitability, and lower ATP content in the heart. Because the ecological significance of the observed effects is not known, this dose was considered a NOAEL. A water ingestion rate of 0.022 L/day and body weight of 0.435 kg (stated by authors) were used to convert the exposure concentrations to units of 5.1 mg/kgBW/day. We feel that this study with rats presents a more defensible TRV than the human epidemiological study.

Beryllium

The IRIS TRV is derived from a long-term feeding study with beagles exposed to beryllium at concentrations of 0, 5, 50 or 500 mg/kg for 172 weeks. All dogs in the 500 mg/kg group showed extensive ulcerative and inflammatory lesions in the gastrointestinal tract. One dog in the 50 mg/kg group had mild, localized intestinal lesions at locations similar to those observed in the 500 mg/kg dogs. A benchmark dose of 0.46 mg/kgBW/day was calculated as the dose at the 95% confidence limit of the dose-response model corresponding to a 10% increase in incidence of intestinal lesions compared with controls.

Our TRV was derived from a study where weanling rats were exposed to beryllium in drinking water for life at a concentration of 5 mg/kg (NOAEL of 0.62 mg/kgBW/day). No adverse effects *were observed; measured effects were median life-span, longevity, incidence of tumors, serum cholesterol, glucose, and uric acid.*

The difference between these two NOAELs is not truly significant as it is likely within the experimental error of both studies. Given the endpoints in the beagle study (mild localized intestinal lesions and the use of a 10% applied to this) we feel we can defend the use of our TRV better, with no substantive difference in the TRV used.

Cadmium

The IRIS TRV for cadmium is derived from a toxicokinetic model that predicts the chronic human drinking water and dietary exposure concentrations (NOAELS of 0.005 mg/kgBW/day and 0.01 mg/kgBW/day for water and food , respectively) and that result in a kidney Cd concentration of 200 µg/gm wet weight (the highest renal level not associated with significant proteinuria).

Our TRV was derived from a study where Cd was administered to mice at a concentrations of 10 ppm in drinking water (Schroeder and Mitchener 1971). Numerous abnormalities were observed in offspring, and sixty percent of the second generation breeding pairs failed to breed . A water ingestion rate of 0.0075 L/day and adult body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day (LOAEL of 2.3 mg/kg BW/day and an estimated NOAEL of 0.23 mg/kg BW/day).

Given our preference for the use of study data vs a model, we feel we can defend our TRV better than the human health TRV based upon a model.

Chromium

The IRIS TRV was derived from a study where Sprague-Dawley rats were administered potassium chromate at six exposure concentrations (0, 0.45, 2.2, 4.5, 7.7 and 11 mg/L ad potassium chromate) for a period of 1 year. No effects (endpoints measured were body weight, food consumption, and blood chemistry) were observed at any exposure level.

Our TRV was derived from a study in which adult female mice were exposed to hexavalent chromium in drinking water at concentrations of 0, 250, 500 and 1000 mg/L throughout their entire gestation period. Resorptions and postimplantation losses were significantly higher in the 250 mg/L exposure group as compared to control; a reduction in cranial ossification was also observed. An ingestion rate of 0.0075 L/day and a body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 56.8 mg/kgBW/day and an estimated NOAEL of 5.68 were calculated based on the results of this *study; these TRVs will be used to evaluate risk from exposure to chromium for mammals in this risk assessment.*

Given that the IRIS TRV is an unbounded NOAEL, we feel we can not defend the use of that TRV.

Manganese

The IRIS TRV is derived from a series of human dietary studies with Mn concentrations ranging from 2 to 8.8 mg/day, at which no adverse health effects were observed. The derived NOAEL is an intake level for the general human population that is not associated with adverse health effects. No studies were reviewed in IRIS that evaluated intake concentrations associated with toxicity.

Our TRV was derived from a chronic study conducted with female rats during a sensitive life stage (day one of gestation through 224 days of age of offspring) which observed adverse reproductive effects (reduced pregnancy rates in F_1 females; decreased testes weight, sperm count and testosterone concentration in F_1 males) was affected in rats which received Mn at a concentration of 3550 mg/kg (268 mg/kgBW/day).

As with other IRIS TRVs, this one is also bsed upon a unbounded NOAEL, and again we do not feel we can defend the use of this TRV in a ERA.

Molybdenum

The IRIS TRV is based on an epidemiology study that correlated the dietary intake of molybdenum with serum uric acid levels and with a gout-like sickness. Due to high molybdenum content in soil and plants, one population had an average molybdenum intake of 10 to 15 mg/kg while daily intake values in the control area was 1 to 2 mg/kg. Thirty-one percent of adults in the high Mo area had gout-like symptoms compared with 1 to 4% of control adults. The average uric acid content of adults from the high Mo was 6.2 mg as compared with a uric acid content of 3.8 mg in controls. An assumed body weight of 70 kg was used to convert the exposure concentration for the high-Mo area group to 0.14 to 0.21 mg/kgBW/day.

Our molybdenum TRV is based on a study where rats were fed diets supplemented with sodium molybdate at concentrations of 0, 20, 80 and 140 mg/kg from weaning through reproduction (Jeter and Davis 1954). The molybdenum content of the basal diet was less than 1 mg/kg. Growth was measured from weaning through 11 weeks of age. Growth of males was significantly reduced at all exposure concentrations, and growth of females was significantly reduced at exposure concentrations of 80 and 140 mg/kg. Seventy five percent of the males fed diets containing 80 and 140 mg/kg Mo were infertile; male infertility was confirmed by pairing *treated males with untreated females. Based on the reduction in male growth, a LOAEL of 20 mg/kg was identified. A body weight of 0.214 kg and ingestion rate of 0.02 kg/day (U.S. EPA 1988; exposure factors for Long Evans rats 0 to 90 days of age) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1.9 mg/kgBW/day and an estimated NOAEL of 0.19 mg/kgBW/day were calculated.*

The IRIS TRV is a LOAEL about equal to our NOAEL. Given that the potential for co-varying exposures (the population was exposed to things other than Mo) plus the endpoint and the assumptions made in the derivation of the TRV; we feel we can defend our TRV better than the IRIS value.

Nickel

IRIS selected their LOAEL from the Ambrose et al. (1976) study. We also included this study in our write-up from which we derive exposure concentrations of 7.7, 77 and 193 mg/kgBW/day using an ingestion rate of 0.027 kg/day and body weight of 0.35 kg (U.S. EPA 1988) to convert the exposure concentrations to units of mg/kgBW/day. Our LOAEL from this study is 77 mg/kgBW/day. In the IRIS write-up, they state the exposure concentrations were "0, 100, 1000 or 2500 mg/kg nickel and were estimated as 0, 5, 50 and 125 mg/kgBW.. No conversion factors are presented. Both the IRIS and our TRV identify the lowest exposure concentration of 100 mg/kg as the NOAEL, and the middle exposure concentration of 1000 mg/kg as the LOAEL..

IRIS selected their NOAEL (5 mg/kgBW/day) from a 90-day study in which rats were administered nickel chloride via gavage at concentrations of 0, 5, 35 and 100 mg/kgBW/day. Decreased body and organ (kidney, liver and spleen) weights were observed in rats exposed at a concentration of 35 mg/kgBW/day.

Our TRVs were derived from a study in which nickel chloride was administered to rats in drinking water at concentrations of 0, 50, 250 or 500 mg/L for 2 generations (Price et al. 1988). Adverse effects on offspring were observed during the perinatal and postnatal periods, rather than during gestation. Significant reductions in live litter size and postnatal body weight of the F_2 litters were observed in the group exposed to nickel at a concentration of 500 mg/L. Nickel consumption during gestation of the F2 litter was 23.1 and 42.1 mg/kgBW/day for the 250 and 500 mg/L exposure groups, respectively (reported by authors). A LOAEL of 42.1 mg/kgBW/day and a NOAEL of 23.1 mg/kgBW/day were identified.

Our process for the selection of appropriate studies places the use of dose application by gavage (forced feeding) as low; this is because these types of applications are designed to create the greatest absorption and allow the use of extreme doses. Based upon this we believe we can defend of TRV over the IRIS TRV.

Selenium

The IRIS TRV is based on a study of approximately 400 individuals in an area of China with high environmental concentrations of Se. A daily intake of 1.261 mg was associated with a blood selenium level shown to reflect clinical signs of selenium intoxication (1.35 mg/L). A daily selenium intake of 0.853 mg produced no clinical signs of selenosis. An average body weight of 55 kg was used to convert the exposure concentrations to units of mg/kgBW/day (LOAEL of 0.023 and NOAEL of 0.015 mg/kgBW/day.

Our selenium TRV is based on a study where rats were given drinking water containing selenium (either as Na_2SeO_3 or Na_2Se_4) at concentrations of 0 or 2 µg/ml for 180 days (Schroeder 1967). Mice (Charles River CD strain) were given selenite in drinking water at a concentration of 0 or 2 µg/ml for 360 days. Increased mortality was observed in rats given selenite in drinking water (58 and 30 percent after 2 months for males and females, respectively). Livers of rats that died were grossly abnormal, with fatty infiltration and degeneration, and cellular atrophy. No adverse effects were observed in mice. A water ingestion rate of 0.053 L/day and body weight of 0.43 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.25 mg/kgBW/day and an estimated NOAEL of 0.025 mg/kgBW/day were calculated based on the results of this experiment.

It should also be noted that we cited two other studies in our TRV write-up that provided NOAELs and LOAELs that are similar to the study cited above.

Silver

The IRIS TRV is derived from a study evaluating the occurrence of argyria in humans following i.v. injections of silver arsphenamine. Total doses ranged from 4 to 20 over a 2 to 9.75 year period. Argyria (a silver-specific condition resulting in silver settling in the skin) is a medically benign but permanent bluish-gray discoloration of the skin that is observed in humans following ingestion of silver. The LOAEL is the lowest dose that resulted in argyria out of 70 cases that were evaluated (4 g silver arsphenamine times 0.23, the fraction of silver in silver arsphenamine).

Our TRV was derived from a chronic study evaluating behavioral effect of dietary silver on mice. The lower motor neurons of the brainstem and spinal cord are primary sites of silver deposition in small mammals exposed to silver. Sixty-day old female mice of the NMRI strain were exposed to silver nitrate in drinking water at concentrations of 0 and 0.015 percent for 125 days. Ten days after termination of silver exposure animals were tested individually in an open field cage. Activity was measured as the number of fields entered plus the total number of times the animal reared, leaned, washed, defecated or urinated per minute. Total activity levels were significantly lowered in silver exposed rats ($P < 0.01$) compared to the controls. The average daily silver intake during the 125-day exposure period was 0.09 mg per mouse. An adult body weight of 0.033 kg (U.S. EPA 1988) was used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 2.7 mg/kgBW/day and an estimated NOAEL of 0.27 mg/kgBW/day were calculated based on the results of this experiment.

Given that the administration of the dose in the IRIS study was by injection and the endpoint is a skin color change, we do not feel we can defend this endpoint for an ERA.

Thallium

The IRIS TRV was derived from a 90-day study in which rats were treated by gavage with an aqueous solution of thallium sulfate at concentrations of 0, 0.01, 0.05 or 0.25 mg/kgBW/day. No effects on body weight, food consumption, or absolute and relative organ weights were observed at any exposure concentration. Moderate dose-related changes were observed in some blood chemistry parameters. The only grossly observed finding at necropsy thought to be treatment related was alopecia (hair loss), especially in female rats. The highest dose tested was identified as the NOAEL.

Our TRV was derived from a study where rats were exposed to thallium (as thallium sulfate) in drinking water at an exposure concentration of 10 mg/L for 60 days (Formigli et al. 1986). There was a significant reduction in sperm motility in rats exposed to thallium compared to a control group. Degenerative changes in Sertoli cells (cells that are the main regulators of normal spermatogenesis) were observed in thallium-treated rats, but not in control animals. A mean daily intake of 270 µg Tl/rat and body weight of 0.365 kg (cited by authors) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 0.74 mg/kgBW/day and an estimated NOAEL of 0.074 mg/kgBW/day were calculated based on the results of this experiment.

Given that the IRIS TRV is an unbounded NOAEL, we do not feel we can defend the use of that TRV for an ERA.

Uranium

The IRIS TRV is based on a study where rabbits were fed diets containing uranyl nitrate hexahydrate at concentrations of 0, 0.2, 0.1 or 5% for 30 days (equivalent to doses of 2.8, 14, and 71 mg/kgBW/day; conversion factors not specified). Kidneys were examined histologically at termination of the experiment. Mortality was observed at the two highest doses (66% at 14 mg/kgBW/day and 100% at 71 mg/kgBW/day). Renal damage was moderate at the two lower doses and moderately severe at the highest dose. The lowest dose tested was identified as the LOAEL. Note: The summary section states the LOAEL is 0.02 ppm uranyl nitrate hexahydrate in food, whereas the description of the study states the exposure dose was 0.02%, which would be 200 MG/KG.

Our TRV was based on a study which evaluated developmental toxicity of uranium to pregnant Swiss mice. Mice were given by gavage daily doses of 0, 5,10, 25 and 50 mg/kgBW/day of uranyl acetate dihydrate on gestational days 6 to 15 (Domingo et al. 1989). Maternal toxicity was observed. Maternal weight gain was significantly lower in the 10, 25 and 50 mg/kg exposure groups, and food consumption was significantly lower in all uranium-exposed mice. Relative liver weights were significantly higher in all exposed females. There were no treatment-related effects on number of implantations, incidence of post-implantation loss, number of live fetuses per litter, or *fetal sex ratio. Body weights of live fetuses were significantly reduced in all uranium-treated groups, and a significant dose-response relationship was observed. Uranium treatment resulted in a significantly increased incidence of external malformations (cleft palate, short or curled tails, hematoma) at all exposure concentrations. An increased incidence of poorly ossified or unossified skeletal elements was observed in mouse fetuses at exposure concentrations of 25 and 50 mg/kgBW/day. Based on the reduced fetal weight and increased incidence of external malformations, a LOAEL of 5 mg/kgBW/day and a estimated NOAEL of 0.5 mg/kgBW/day were identified from this experiment.*

Given the uncertainty in the dose-related calculations of the IRIS TRV, we feel we can not defend the value; Currently, we feel our TRV is more defensible.

Vanadium

The IRIS TRV is derived from a chronic study where rats were exposed to dietary concentrations of 17.9 or 179 mg/kg vanadium pentoxide for 2.5 years. Effects measured were growth rate, survival, and hair cystine content. The only significant effect was a decrease in the amount of cystine in the hair of vanadium-exposed rats. An ingestion rate of 5% of the body weight per day (assumption, no supporting citation) was used to convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 0.89 mg/kgBW/day was identified (17.9 mg/kg).

Our TRV was derived from a study where rats were exposed to vanadium via oral intubation at concentrations of 2.1, 4.2 and 8.4 mg/kgBW/day for 60 days prior to gestation through lactation. Significant differences in reproductive parameters (number of dead young/litter, size and weight of offspring) were observed at all dose levels. A LOAEL of 2.1 mg/kgBW/day and an estimated NOAEL of 0.21 mg/kgBW/day were identified.

Given the nature of the response in the IRIS study that cystine content in hair is not inherently important to the survival of the organism, we do not feel that we can defend the use of the IRIS TRV for an ERA.

Zinc

The IRIS TRV is based on a clinical study that evaluated the effects of oral zinc supplements on copper and iron balance. In women who received zinc supplements at a concentration of 50 mg Zn/day for 10 weeks, a significant decrease in erythrocyte superoxide dismutase activity was observed. Serum ferritin and hematocrit values also declined significantly. Dietary zinc was not measured, but was estimated as 9.72 mg/day. A body weight of 60 kg was used to convert the exposure concentration to units of mg/kgBW/day. It should be noted that this estimated dietary zinc level of 9.72 mg/day is below the recommended daily zinc supplement of 15 mg/day for children and adults.

Our TRV is based on a study where adult mink were exposed to a diet supplemented with 1000 mg/kg zinc (as $ZnSO_4 \cdot 7H_20$*) for 22 weeks; the control diet contained 20.2 mg/kg zinc. Kits were maintained on the same diet as their parents for 12 weeks following their birth. Gestation length,* *litter size, kit birth weight and kit mortality to weaning were not significantly different between the Zn-treated and control groups. Reduced growth rate, alopecia, achromatrichia and profound immunosuppression were observed in the offspring produced by the Zn-treated females. An ingestion rate of 0.249 kg/day and a body weight of 1.13 kg were used to convert the exposure concentration to units of mg/kgBW/day, resulting in a LOAEL of 225 mg/kg BW/day and an estimated NOAEL of 22.5 mg/kg BW/day.*

Given the response measured in the IRIS study that does not directly relate to organism survival, we do not believe we can defend the use of this study for an ERA.

Inquiry #2:

2. Confidence limits are not provided with the LOAELs and NOAELs.

Response to Inquiry #2:

We have not generally seen confidence limits applied to LOAELs and NOAELs. A much more robust database, as well as the need to obtain the original data from each study may be required to do this. We do agree that it would be preferable to have this information and there are some efforts being made to generate these types of evaluations, such as the soil screening values effort by a multi stake-holder group composed of EPA, Department of Defense, and industry. However, only a couple of metals have been done and even these values have not been released.

Inquiry #3:

3. The Tribe understands that EPA has not selected some of the studies because growth was considered not ecologically relevant and in some cases because growth was not as assessment endpoint. However, growth *is* an attribute that can be measured, *is* predictive of the assessment endpoint, and *is* a measurement relevant at the individual level, whereas assessment endpoints are at the population, community, or ecosystem level. Growth and reproduction together *are* ecologically relevant endpoints.

Response to Inquiry #3:

We do consider growth reduction to be an ecologically relevant effect and many of our TRVs do consider these endpoints. However, in some cases we may have placed more of an emphasis on reproduction and/or mortality effects; we believe we have done this when it is appropriate based upon the study design and/or the mechanism of toxicity. We appreciate the reviews of our TRVS which challenge our interpretation of the studies reviewed, because these challenges result in a re-evaluation of our assessment of the studies reviewed, which can alter our conclusions. As *resources permit, ERT continues to review and update TRVs as new data becomes available or that certain information was previously overlooked.*

Inquiry #4:

4. Without access to all cited literature available for review, a reader of the TRV documents cannot attribute the observed effects levels solely to an administered dose. No laboratory metabolic rates appear in the text to confirm the condition or state of the subject species during ingestion or forced feeding.

Response to Inquiry #4:

Many studies used to develop TRV's do not report metabolic rates; most compare ingestion and body weights with those of control animals as an indicator of condition and information about the state of the subject simply isn't available. While we would be willing to provide copies of the references used to develop the TRVs, as with the literature used to develop the life history profiles, it is impractical to do so. The volume of materials involved is again substantial, and copywrite issues would also apply. As an additional note, unless no other studies are available, we prefer not to use studies which use injection or forced feeding as we feel these are not applicable to wildlife exposure.

Inquiry #5:

5. To produce adverse effects, metals must bioaccumulate and metabolize (where uptake exceeds elimination) in excess of a threshold concentration at the specific site of action, whether it be in a laboratory or in the field. The studies presume 100% bioaccumulation and complete metabolization of the COCS. No metabolic rates are reported for the laboratory and in most cases there is no mention of excretion studies, the lack of which infer error in the threshold values estimated.

Response to Inquiry #5:

Although the studies used don't address bioaccumulation specifically, they do measure adverse effects. Thus, while the tissue concentrations at which adverse effects occur are not known in many cases, the studies do provide an indication of the exposure concentrations which elicit adverse effects. As noted, we are greatly limited by the studies which are available in the literature, many of which were not designed with our use of the results in mind. However, they are the only information we currently have, and we attempt to use this information in the most technically defendable way, recognizing the limitations of the studies.

Inquiry #6:

6. Bioavailability and bioconcentration are not constants either in the lab or in the field. How are corrective factors determined for variance in bioaccumulation (ingestion and elimination) as well as metabolic rate?

Response to Inquiry #6:

The TRV's represent the exposure concentrations that often result in adverse effects to receptors. Our preference for studies which are chronic exposures or longer term studies is in part based upon the issue raised. The longer the study (exposure) the more confident we can be that the organisms are at some level of steady state with accumulation and excretion. The effect of metabolic rate on the these studies is not known, but for some contaminants metabolic rate may have an effect toxicologically. However, the influence of metabolic rate on feeding is clear. Higher metabolic rate or activity level should result in a higher feeding rate if the food is available. Unfortunately there is little we can do to adjust for this issue in the literature studies, but we can acknowledge this issue in the ERA.

Inquiry #7:

7. Elevated administering of metals on the scale in these studies ignore deleterious ecological effects prior to the observance of mortality in small mammals. An example of this is the exclusion of species through habitat degradation.

Response to Inquiry #7:

Certainly, the previous mining operations have not only resulted in elevated concentrations of metals imposing risk to a variety of organisms, but also have physically altered the terrain resulting in habitat degradation to the level of causing the exclusion of species within the mined area. We are assuming within the ERA that the assessment endpoints (the receptors) do reside in all relevant areas (in particular the mined area). We recognize that the mined area is highly disturbed but are assuming the area is used in spite of this. In this way we hope not to underestimate contaminant risks because of habitat degradation. It should also be recognized that in Superfund we are legally bound to evaluate chemical risk and not physical disturbance.

Inquiry #8:

8. When should we expect the draft TRVs for reptiles?

Response to Inquiry #8:

Toxicological studies on reptiles are quite limited. Likewise, dietary information and body burden data of potential contaminants is also lacking in the published literature for reptiles. This limited database prohibits an adequate approach in utilizing reptiles as receptors for an assessment endpoint, as opposed to amphibians where the database is somewhat more robust for which an assessment endpoint has been defined for this ERA.

It is noted that for this site there are several snakes (bull snake, common garter snake, rubber boa, striped whipsnake, Western rattlesnake, Western terrestrial garter snake, Western yellow-bellied racer) , two lizards (Short-horned lizard, Northern alligator lizard), and a turtle (painted turtle) that have been identified as reptiles that are potentially present in the Midnite Mine project. Of these reptiles, the striped whipsnake is listed as a candidate for the state's threatened and endangered list (URS 2000).

We will acknowledge the issue of risk to reptiles, and attempt a qualitative assessment of the potential based upon risks to other assessment endpoints. If information becomes available to do a more quantitative assessment we will do this.

Memorandum from U.S. Fish and Wildlife Service; Dated May 21, 2003; Subject: Comments on Toxicity Reference Values and Life History Profiles for the Midnite Mine Ecological Risk Assessment.

A. Toxicity Reference Values (TRVs) for Birds and Mammals

TRV Inquiry #1:

1) The Terrestrial Ecological Risk Assessment Approach document (URS 2001) originally developed for this risk assessment identified TRVs, uncertainty factors and benchmarks for birds and mammals (Tables 3-6 and 3-7). Some of these values, primarily from Sample et al. (1996), are more conservative than the TRVs identified for use in this risk assessment. Values for aluminum, arsenic, barium, beryllium, cobalt, copper, iron, magnesium, manganese, mercury, thallium, uranium, vanadium and zinc are generally more conservative in URS (2001) (either for birds, mammals or both) than those identified in the TRV documents/Summary Table. Sample et al. (1996) also establishes mammal TRVs for boron. In some cases the values identified in URS (2001), Tables 3-6 and 3-7, are much lower, e.g., iron and magnesium TRVs for mammals and the manganese LOAEL for birds. For some values, the same studies and TRVs may be relied upon for both URS (2001) and the subject documents but the application of uncertainty factors result in the more conservative values in URS (2001). Were the values in URS (2001) reviewed and considered for birds and/or mammals, and if so what

was the justification for not using these more conservative values to establish TRVs when they were originally identified in previous work for this risk assessment?

Response to TRV Inquiry #1:

The table below presents the TRV values between ERT and URS. In addition, a brief synopsis is provided for each analyte.

Some of the criteria that we use for processing our TRVs is briefly discussed. If a study reports both a LOAEL and NOAEL value, we use both values from the same study, as this provides a bounded effect level. If an effect is observed at the lowest concentration tested, we estimate a NOAEL using a factor of 10, unless the proportionality is known to be different. Several statistical studies have been published that support using this conversion factor, based on review of studies where both values were reported.

We do not use a LOAEL reported in one study, and a NOAEL reported from a different study. The NOAEL from a particular study is influenced by dietary concentrations which are tested, the statistical power of tests used to analyze data from a particular experiment, and species tested. In addition, NOAELs are endpoint specific; we feel it is not appropriate to select a LOAEL from a study that reports reproductive effects and a NOAEL from a study that reports growth suppression.

Table: Comparative Toxicity Reference Values (TRV's) between ERT and URS

	ERT		URS		ERT		URS	
Analyte	Mammals		Mammals		Birds		Birds	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
	mg/kgBW/day		mg/kgBW/day		mg/kgBW/day		mg/kgBW/day	
Aluminum	1.93	19.3	6.43	19.3	49.8	68.7	4.45	14.8
Antimony	0.062	0.62	0.417	1.25	NS	NS	NS	NS
Arsenic	1.91	9.63	0.42	1.26	5.7	22.8	1.7	4.28
Barium	5.1	51	5.1	15.3	208.3	416.5	23	46
Beryllium	0.62	6.2	1	2	NS	NS	NS	NS
Cadmium	0.23	2.3	1	18	0.85	3.4	1.45	20
Chromium	5.68	56.8	2737	8211	1	5	1	5
Cobalt	5	20	0.47	1.4	23.1	43.9	NS	NS
Copper	24.3	35.4	11.7	15.4	26.9	33.2	16	21
Iron	350	1000	3.33	10	NS	NS	NS	NS
Lead	8	80	8	80	1.5	15	1.13	11.3
Magnesium	5,542	12,308	18.67	56	345	462	NS	NS
Manganese	83	268	88	284	977	9,770	997	2991

Mercury	0.032	0.16	0.05	0.082	0.0051	0.051	0.45	0.9
Molybdenum	0.19	1.9	0.87	2.6	3.55	35.5	11.8	35.3
Nickel	23.1	42.1	40	80	57.2	79	77.4	107
Selenium	0.025	0.25	0.2	0.33	0.4	0.8	0.4	0.8
Silver	0.27	2.7	25	74	3.97	39.7	55	166
Thallium	0.074	0.74	0.08	0.25	0.12	1.2	NS	NS
Uranium	0.5	5	3.1	6.1	160	1,600	16	48
Vanadium	0.21	2.1	0.7	2.1	11.4	114	3.8	11.4
Zinc	22.5	225	160	320	10.5	223.5	14.5	131

NS - no studies available

Comparison between our TRVs and URS's TRVs (See Table):

Birds

Aluminum *The URS TRV is not from Sample 1997 as cited; the source is unknown. The Sample value is from study that only observed NOAEL at an exposure concentration of 1000 mg/kg (109.7 mg/kgBW/day). ERT TRV is from Hussein et al. 1989, and is the dose at which egg production was significantly decreased in chickens.*

Arsenic *ERT has requested the original paper that the URS TRV from Sample is based on; in addition, URS added a conversion factor (CF) of 3 to the cited LOAEL. ERT does not use a study for a TRV unless we can review the original paper and determine whether the study methods were appropriate, and whether the values cited in the secondary source are correct. ERT number is based on a mallard study where the endpoint was duckling production.*

Barium *These TRVs are based on the same study. At a dose of 416.5, 5% mortality was observed. Study duration was 4 weeks; URS added a CF of 3 to go from a subchronic to chronic LOAEL. Another CF of 3 was added to go from a lethal to non-lethal endpoint.*

Cadmium *ERT's TRV is based on a different study. The study we used to identify our LOAEL yields a lower LOAEL than the study cited in Sample. If a study reports both a NOAEL and LOAEL, ERT used both TRVs reported in that study, rather than the lowest reported LOAEL from one study and the highest reported NOAEL from a different study.*

Copper *ERT's TRV is based on a different study. URS used a CF of 3 to convert the LOAEL in Sample (61.72 mg/kgBW/day) to a non-lethal LOAEL (endpoint in the study we use is egg production).*

Lead *These TRVs are based on the same study. Sample used an ingestion rate calculated using an allometric equation, we use one cited for this species. It should be noted that the Nagy equation used to calculate the ingestion rate yields a dry weight result; no conversion to wet weight was done.*

Manganese *These TRVs are based on the same study. Only a NOAEL was observed. URS used a factor of 3 to calculated a LOAEL, ERT used a factor of 10.*

Mercury *ERTs TRV is based on a different study. ERT reviewed several studies with lower LOAELs than the study URS selected.*

Nickel *These TRVs are based on the same study. ERT used an ingestion rate (IR) measured for mallard ducklings; Sample estimated an IR based on adult food consumption.*

Silver *These TRVs are based on different studies. ERT reviewed the Jensen et al. (1974) study that URS used to select their TRV. However, we found a similar study conducted with broiler chicks (Peterson and Jensen 1975) that cited a lower LOAEL. As stated before, ERT does not select the study with the lowest LOAEL and a different study with the highest NOAEL to derive TRVs. Because adverse effects were observed at the lowest dose tested in Peterson and Jensen (1975), ERT used a CF of 10 to estimate a NOAEL from an observed LOAEL.*

Vanadium *These TRVs are based on the same study. No adverse effects were observed, therefore the highest dose tested (11.4 mg/kgBW/day) was considered a NOAEL. Although mortality was one of the endpoints selected for the study even though no mortality was determined, URS applied an uncertainty factor of 3 to convert the NOAEL in the study.*

Zinc *The original paper reviewed by Sample was obtained. Egg hatchability in one sample unit tested was lower, but for the experiment egg hatchability for treated birds was not different from controls. The LOAEL cited by Sample is a NOAEL. ERTs TRV is based on a different study.*

Mammals

Aluminum *These TRVs are based on the same study. URS used an CF of 3 to convert a LOAEL to a NOAEL, while ERT used a factor of 10.*

Arsenic *These TRVs are based on different studies. ERT does not use the study in Sample as statistical analysis was not conducted on the difference in litter size between control and treated animals, and insufficient data was presented in the paper to do so.*

Antimony *These TRVs are based on different studies. A later study conducted by Schroeder using rats resulted in a LOAEL of 0.62 mg/kgBW/day; the 1968 study by Schroeder using mice resulted in a LOAEL of 1.25 mg/kgBW/day. The endpoint measured in both studies was longevity.*

Barium *These TRVs are based on the same study. URS used a factor of 3 to convert a NOAEL to a LOAEL, while ERT used a CF of 10.*

Beryllium *These TRVs are based on the same study. ERT used a BW and WIR cited for the strain of rat used in the study, Sample used factors for a different rat strain. URS used a factor of 3 to convert a NOAEL to a LOAEL, and ERT used a factor of 10.*

Cadmium *These TRVs are based on different studies. ERT reviewed several studies that resulted in lower LOAELs than the Sutou et al. (1980) study cited in Sample. ERT selected a study where mice were exposed to cadmium in drinking water to derive the TRV. Numerous abnormalities were observed in offspring, and sixty percent of the second generation breeding pairs failed to breed . As stated before, ERT does not select the study with the lowest LOAEL and a different study with the highest NOAEL to derive TRVs. Because adverse effects were observed at the lowest dose tested in Schroeder and Mitchner (1971), ERT used a CF of 10 to estimate a NOAEL from an observed LOAEL*

Chromium *The URS TRV is a NOAEL observed in rats fed diets containing Cr+3. ERTs TRV is from a study where mice were exposed to Cr+6 in drinking water throughout gestation. Resorptions and postimplantation losses were significantly higher in the 250 mg/L exposure group (56.8 mg/kgBW/day) compared to controls. As stated before, ERT does not select the study with the lowest LOAEL and a different study with the highest NOAEL to derive TRVs. Because adverse effects were observed at the lowest dose tested in Trivedi et al. (1989), ERT used a CF of 10 to estimate a NOAEL from an observed LOAEL.*

Cobalt *These TRVs are based on different studies. Endpoints observed in the study ERT used to derive the TRV were testicular atrophy and behavior.*

Copper *These TRVs are based on the same study. Upon review of the original paper, it was determined that the statistically significant LOAEL was actually 160.5 mg/kg, not 110.5 mg/kg as cited in Sample.*

Iron *The TRV identified by URS seems quite low; it is derived from an acute LD50 using uncertainty factors. In all the studies reviewed to derive ERTs TRV, iron concentration of the basal diet was 35 mg/kg.*

Magnesium *The URS TRVs are derived from a single dose study which cited an acute LD50. ERT TRVs are from a 13-week dietary exposure study. The lowest dose tested in the study (no effects observed) was higher than the one cited as a single dose LD50 in the study used by URS. Additionally, a dietary requirement of 0.5 g/kg diet is recommended for growing and mature, non-pregnant rats (NRC 1995) (0.035 g/kgBW/day, using a BW of 0.48 kg and ingestion rate of 0.034 kg/day, cited for adult Sprague Dawley rats in U.S. EPA 1988).*

Manganese *These TRVs are based on the same study. ERT used a BW and IR for the rat strain that was used in the study while Sample uses BW and IR for a different rat strain.*

Mercury *These TRVs are based on different studies. The URS numbers are lower because they use a CF of 3 to convert a subchronic LOAEL (0.245 mg/kgBW/day, study duration 93 days) to a chronic LOAEL. ERT based the TRV on a 3-generation dietary study in rats.*

Nickel *These TRVs are based on the same study. The difference is due to use of a generic rat BW and ingestion rate by Sample, ERT used a BW and IR cited for the species used in the experiment.*

Selenium *These TRVs are based on different studies. Increased mortality was observed in mice exposed to selenium in drinking water at a concentration of 0.25 mg/kgBW/day. As stated before, ERT does not select the study with the lowest LOAEL and a different study with the highest NOAEL to derive TRVs. Because adverse effects were observed at the lowest dose tested in Schroeder (1967), ERT used a CF of 10 to estimate a NOAEL from an observed LOAEL.*

Silver *These TRVs are based on different studies. Significantly reduced activity was observed in mice exposed to silver in drinking water at a concentration of 2.7 mg/kgBW/day. As stated before, ERT does not select the study with the lowest LOAEL and a different study with the highest NOAEL to derive our TRVs. Because adverse effects were observed at the lowest dose tested in Rungby and Danscher (1984), ERT used a CF of 10 to estimate a NOAEL from an observed LOAEL.*

Thallium *These TRVs are based on the same study. URS converted a subchroninc LOAEL (study duration 60 days) to a chronic LOAEL using a factor of 3.*

Vanadium *These TRVs are based on the same study. URS converted a LOAEL to a NOAEL using a factor of 3 whereas ERT used a factor of 10.*

Zinc *These TRVs are based on different studies. The ERT TRV was selected from a study where adult mink were exposed to a diet supplemented with 1000 mg/kg zinc (as $ZnSO_4 \cdot 7H_20$) for 22 weeks; the control diet contained 20.2 mg/kg zinc (Bleavins et al. 1983). Kits were maintained on the same diet as their parents for 12 weeks following their birth. Gestation length, litter size, kit birth weight and kit mortality to weaning were not significantly different between the Zn-treated and control groups. Reduced growth rate, alopecia, achromatrichia and profound immunosuppression were observed in the offspring produced by the Zn-treated females. Based on the reduced growth observed in the offspring, a LOAEL of 225 mg/kgBW/day was identified based on this experiment. As stated before, ERT does not select the study with the lowest LOAEL and a different study with the highest NOAEL to derive TRVs. Because adverse effects were observed at the lowest dose tested in Bleavins et al. (1983), ERT used a CF of 10 to estimate a NOAEL from an observed LOAEL.*

TRV Inquiry #2:

2) Uncertainty factors were applied to TRVs for some contaminants to establish benchmarks in Tables 3-6 and 3-7 of URS (2001), to convert from subchronic to chronic values, nonlethal LOAELs to nonlethal NOAELs, ect., in addition to the acute-to-chronic factor of 10 (where either a LOAEL or NOAEL must be estimated). It has been stated that no uncertainty factors will be applied for the purposes of this risk assessment. Please explain again the justification for not using uncertainty factors, why this is a better approach than the approach originally proposed in URS (2001) which applied uncertainty factors, and how the risk assessment will be sufficiently conservative without the use of uncertainty factors.

Additionally, wildlife in a natural environment are subject to numerous stressors (poor nutrition, disease, greater energy expended for predator evasion or finding food) that may exacerbate toxic responses to contaminants. Test animals in the lab are not typically subject to these stressors. On the other hand, survival responses in a wild animal may be impaired by exposure to contaminants, potentially resulting in mortality, whereas the same exposure in a test animal may cause only a sublethal effect. How will these differences be addressed if no uncertainty factors are applied?

Response to TRV Inquiry #2:

As noted earlier we make a distinction between conversion factors and safety or uncertainty factors. We do use conversion factors to convert LOAEL to NOAEL, for example. We are not applying uncertainty factors or safety factors to the TRV (NOAEL or LOAEL) once it is developed. We do recognize that wildlife are under stress beyond those resulting from chemical exposures, and will acknowledge this within the ERA. This will be done within the uncertainty section and we will also acknowledge this within the summary of the risk characterization.

TRV Inquiry #3:

3) Many of the studies reviewed describe sublethal effects that the subject document(s) consider to be not ecologically relevant. It is important to note that many scientists (including study authors, and the Service) do consider these effects to be ecologically relevant. For example, many of the indicators of lead toxicity identified in the Hoffman papers (in the bird TRV document) are well established indicators of lead toxicity, and have been correlated with varying degrees of impaired biological function, morbidity and mortality. In addition, Mebane (2003) examined early-life stage growth reduction in wild fish as it relates to population risk. He reviewed numerous studies that showed relationships between growth reduction and overwinter mortality of various fish species. We feel that the language in these documents should be revised such that it does not rule out ecological relevance of growth reduction and numerous other sublethal effects, and that selection of TRVs should not necessarily be limited to concentrations of contaminants that result in reproductive effects or death.

Reponse to TRV Inquiry #3:

As previously stated in response to concerns expressed by the Spokane Tribe of Indians/AESE, Inc., we do consider growth reduction to be an ecologically relevant effect. In some cases we may have placed more of an emphasis on reproduction and/or mortality effects depending on the nature of the study. We do acknowledge that there is a difference in what is considered an effect vs a measure of exposure. We are always open to discussing these issues, but we may ultimately decide that for our purposes an endpoint which others consider an impairment or adverse effect, we do not; in these cases we will strive to acknowledge the debate in the ERA such that the concerns are not discounted.

TRV Inquiry # 4:

4) The potential for hexavalent chromium to exist and to be ecologically available at this site has been discussed previously on conference calls, and it has been determined that further investigation into this issue was needed. Has it been determined that hexavalent chromium is not a potential ecological threat at this site, and if so, based on what information? If there is the potential for hexavalent chromium exposure of ecological receptors will more conservative TRVs be applied, or will separate TRVs be applied for hexavalent chromium and trivalent chromium?

Response to TRV Inquiry #4:

A write-up on the bioavailability and speciation of chromium in soil is forthcoming. Chromium primarily occurs in nature as trivalent chromium [Cr (III)] as the chromite mineral. Cr (III) is the primary form in soils since hexavalent chromium [Cr(VI)] is readily reduced to Cr (III) in most soil conditions. Even if Cr(VI) is introduced to soils via contamination, it will be rapidly reduced by soil organic matter. Certain studies have shown that when Cr(III) as a solution is added to soils that it readily oxidizes to Cr(VI). The key to the oxidation appears to be the presence in the soil of oxidized manganese (Mn), which serves as the electron receptor in the reaction, but this oxidation was only evidenced when CR(III) solutions were added to the soils.

Both Cr(III) or Cr(VI) have been considered for the TRV and benchmark values depending on the studies available. For birds, we were only able to locate one study evaluating dietary toxicity of hexavalent chromium that reported a LOAEL. This was observed at the lowest exposure concentration tested, 900 mg/kg. Our TRV is based on a study which used trivalent chromium, however we selected this study because the reported LOAEL is the lowest we found. The mammal TRV is based on exposure to hexavalent chromium. The surface water benchmark for the screening level ERA is based on Cr (VI).

TRV Inquiry #5:

5) The proposed copper NOAEL for birds (28.9 mg/kg BW/day) is higher than levels shown to cause decreased growth (24.9 mg/kg BW/day) and respiratory problems (23.1 mg/kg BW/day) in chickens, as reported in other studies cited in the subject document. Without further detail to determine if the other studies are relevant, the selected "no effect level" does not seem conservative relative to the effects demonstrated at similar concentrations in the other studies.

Response to TRV Inquiry #5:

We went back to the original studies and re-reviewed them to determine whether the cited effect levels were relevant. Below is our revised summary; the first two paragraphs were revised, and an additional study was obtained (last paragraph). Accordingly, we have changed our copper NOAEL to 26.9 mg/kg BW/day and LOAEL to 33.2 mg/kg BW/day.

Copper

In a chapter titled "Poisons causing Respiratory Insufficiency", Hatch (1978) cites a study that reports "in chicks, 325 ppm of copper in the diet can cause signs of toxicosis, although if the copper is present as copper oxide, chicks may tolerate 500 ppm without ill effect". The original citation for this study is not provided in Hatch; an earlier review is cited. Because age of chicks is not specified by Hatch, it is not possible to estimate body weight and ingestion rate, and the exposure concentrations cannot be converted to units of mg/kgBW/day. In addition, parameters that were used to measure "signs of toxicosis" were not stated. Therefore, this study was not used to derive a TRV for copper.

Mayo et al. (1956) evaluated copper tolerance of young chickens. Growth, mortality and occurrence of muscular dystrophy were measured. In one experiment, a dietary concentrations of 324 mg/kg resulted in muscular dystrophy and a significant inhibition of growth at 4 weeks of age. In another experiment, dietary copper at a concentration of 520 mg/kg caused reduced growth at 4 weeks of age, but body weights of Cu-exposed birds was equal to controls at 8 weeks of age. When copper was added as copper-bound casien instead of as copper sulfate, growth depression was not observed, but the incidence of muscular dystrophy remained the same. Significant mortality was observed in chicks fed diets containing copper at a concentration of 1270 mg/kg. This paper was only presented as an abstract, and it was not clear whether the chicks in the two experiments where growth inhibition was observed received different diets or different forms of supplemental copper. No methods were presented to evaluate sample size, experimental design, or statistical analysis, therefore this study was not used to derive a TRV for copper.

One- day old New Hampshire chicks were fed diets containing supplemental copper (as copper oxide) at nominal concentrations of 0, 10.8, 26, 47.5, 78, 121.1, 182, 268.1, 390, 562.2, 806, 1,150.4 mg Cu/kg diet for 10 weeks {Mehring, 1960 #1306}. The basal diet contained 26 mg Cu/kg, and the 4 highest exposure diets were analyzed and found to contain copper at concentrations of 403, 570, 749 and 1,180 mg/kg. The average live weight of chicks that received the diets containing 570, 749 and 1,180 mg Cu/kg were 94.0%, 70.1% and 51.0% of the live weight of chicks fed the basal diet, respectively. Mortality rates of 15 and 40% were observed in the two highest exposure groups. After 6 weeks of feeding on the basal diet, the average live weight of chicks in the three highest exposure groups were 100.5%, 86.4%, and 83% of the live weights of chicks that received the basal diet for the duration of the experiment. Based on decreased growth, an exposure concentration of 749 mg Cu/kg diet was identified as the LOAEL in this experiment. A body weight of 0.356 kg and ingestion rate of 0.031 kg/day [cited in U.S. EPA (1988) for 5 week old chicks] were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 65.2 mg/kgBW/day and a NOAEL of 49.6 mg/kgBW/day were identified based on the results of this experiment.

A flock of 51-week old leghorn hens experienced a 16% decrease in egg production in a single week (Gilbert et al. 1996). Analysis of the feed showed a copper concentration of 1477 mg/kg copper. Severe oral ulcers were present in the pharynx of the hens. To confirm that the observed ulcers and decrease in egg production were due to excess dietary copper, a group of 35 hens were fed diets containing copper (as copper sulfate) at a concentration of 1437 mg Cu/kg diet for 2 weeks; the control group received a basal diet with a copper concentration of 78 mg Cu/kg. Egg production and food consumption were significantly lower in hens fed the high-copper diet than in hens fed the basal diet. Pharyngeal lesions and gizzard erosions were significantly increased in hens fed the high copper diet. A body weight of 1.45 kg (U.S. EPA, 1988) and food ingestion rates of 0.129 kg/day (basal diet group) and 0.060 (1437 mg/kg group, cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 59.5 mg/kgBW/day and a NOAEL of 6.9 mg/kgBW/day were calculated based on the results of this experiment.

Jackson (1977) exposed chickens to dietary concentrations of Cu ranging from16 mg/kg (control diet) to 1936 mg/kg for 35 days. No effects on growth were observed at an exposure concentration of 256 mg/kg, while exposure to copper at a concentration of 496 mg/kg caused marked body-weight loss. Egg production was not affected at an exposure concentration of 496 mg/kg, but it significantly decreased at an exposure concentration of 976 mg/kg. Because of the ecological significance of the reproductive endpoint (egg production), these values were used to develop a NOAEL (496 mg/kg) and LOAEL (976 mg/kg) in this assessment. Ingestion rates and body weights for each treatment group cited by the author were used to convert the exposure concentrations to units of mg/kgBW/day (0.101 kg/day and 1.73 kg, and 0.082 kg/day and 1.62 kg, respectively). A LOAEL of 49.4 mg/kgBW/day and a NOAEL of 28.9 mg/kg BW/day were calculated based on the results of this experiment.

White leghorn layers were fed diets supplemented with 0, 200, 400, 600, or 800 mg/kg copper sulfate for 4 weeks (Chiou et al. 1997). Measured dietary copper concentrations were 27, 195, 405, 598 and 758 mg Cu/kg. Food intake, egg production, liver function, and copper residues in the liver, egg and excreta were measured. Food intake and egg production were significantly lower than that measured for control birds for the 598 and 758 mg/kg exposure groups. Liver enzyme activities were significantly higher in birds exposed at dietary concentrations of 598 and 758 mg/kg. Histological examination of livers showed bile duct proliferation and lymphocyte infiltration in livers of birds exposed at a concentration of 758 mg/kg. Copper residues in liver and excreta increased significantly as exposure concentration increased, and egg concentrations peaked at an exposure concentration of 405 mg/kg. Based on reduced egg production, the exposure concentration of 598 was selected as the LOAEL for this experiment. Food ingestion rates of 0.097 and 0.077 kg/day and body weights of 1.461 and 1.393 kg (cited by authors for the 405 and 598 mg/kg exposure groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 33.2 mg/kg BW/day and a NOAEL of 26.9 mg/kg BW/day will be used to evaluate risk posed by Cu to avian receptors.

TRV Inquiry #6:

6) The uranium TRVs for birds were taken from the Haseltine and Sileo (1983) study, which investigated effects of depleted metallic uranium on black ducks. This study may not be relevant to the Midnite Mine situation, since the uranium was in metallic form and, as stated by Haseltine and Sileo, Durbin and Wrenn (1975) considered elemental uranium to be biologically inert, and only the uranium salt forms were capable of being absorbed and biologically incorporated. The authors of this study also note that no effects were seen in black ducks fed a nutritionally sound diet, which is potentially not the case in the wild. In addition, URS (2001) Table 3-7 identifies values for uranium, presumably from the same study (black ducks fed depleted metallic uranium), but the chronic NOAEL is identified as 16.0 mg/kg BW/day (instead of 160 mg/kg BW/day, as identified in the subject document) with an estimated LOAEL of 48.0 mg/kg BW/day (uncertainty factor of 3). Sample et al. (1996) is cited as the source of this information. If these values are derived from the same study (Haseltine and Sileo 1983) this discrepancy should be investigated. Review of Sample et al. (1996) would resolve this issue, and may provide the best information regarding uranium TRVs for birds. The Savannah River website may also provide relevant information. In addition, Service staff located an abstract that investigates renal damage to Japanese quail from uranyl nitrate (Kupsh et al. 1991) but were not able to review the study. If the study identifies degrees of renal damage correlated with dose it may provide useful TRV information, since severe renal damage can result in kidney failure, coma and death (Sileo 2003).

Response to TRV Inquiry #6:

The highest exposure concentration tested in this experiment was 160 mg/kgBW/day; no adverse effects were observed at this concentration. Because study duration was less than 10 weeks and it was not conducted on a sensitive life stage, URS used an uncertainty factor of 0.1 to convert the subchronic NOAEL to a chronic NOAEL. ERT did not use any conversion factors to derive the TRVs. The exposure concentration tested, 160 mg/kgBW/day, was the concentration identified as the NOAEL.

We did review the Kupsch et al. 1991 paper and presented the study in our TRV write-up. However, we did not utilize the study to derive our TRV values since the exposure route was *based on an intravenous administration as opposed to an oral route. Below is the revised write-up.*

Toxicity of Uranium to Birds

Kupsh et al. (1991) evaluated renal damage in Japanese quail exposed to uranyl nitrate. Uranyl nitrate solution at concentrations of 0.15 or 50 µMol U/kg body weight was administered intravenously. Eighteen hours later, the quail were sacrificed and the kidneys were examined. Severe damage was observed in the quail exposed at a concentration of 50 µMol U/kg body weight, particularly in the distal tubules. Glomerular damage was marked in quail kidneys, with atrophy, necrosis, and proteinuria. Due to the exposure route, this study was not used to derive a TRV for uranium to birds. Only studies that evaluated oral exposure to uranium were used to derive a TRV for this risk assessment, which is evaluating dietary exposure to contaminants of concern.

American black ducks were fed diets containing powdered uranium at concentrations of 0, 25, 100, 400 or 1600 mg/kg for 6 weeks (Haseltine and Sileo 1983). One male in the 100 mg/kg treatment group died during the experiment, but pathological kidney changes associated with uranium toxicity in mammals were not observed; the authors did not attribute the death to uranium exposure. Treatment-related weight loss was not observed at any exposure concentration. No significant gross or microscopic lesions were observed in birds exposed at any concentration. Examination of the kidneys did not reveal any lesions in the distal third of the proximal convoluted tubule, which is characteristic of uranium exposure in mammals. A body weight of 1.25 kg (Dunning 1993) and an ingestion rate of 0.125 kg/day (Heinz et al. 1989) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 160 mg/kgBW/day and an estimated LOAEL of 1600 mg/kgBW/day will be used to evaluate the toxicity of uranium to avian receptors.

Dunning, J. B., Jr. (1993). CRC Handbook of Avian Body Masses. Boca Raton, FL, CRC Press.

Haseltine, S. D. and L. Sileo (1983). "Response of American black ducks to dietary uranium: a proposed substitute for lead shot." J. Wildl Manage. ***47****: 1124-1129.*

Heinz, G. H., D. J. Hoffman and L. G. Gold (1989). "Impaired reproduction of mallards fed an organic form of selenium." J. Wildl. Manage. ***53****: 418-428.*

Kupsh, C.C., R.J. Julian, V.E.O. Valli and G.A. Robinson. 1991. Renal damage induced by uranyl nitrate and estradiol-17beta in Japanese quail and Wistar rats. Avian Pathology. 20(1):25-34

TRV Inquiry #7:

7) The proposed zinc NOAEL for birds is 145 mg/kg BW/day based on Dewar et al. (1983). However, in another study described in this document (Stahl et al.1989) this dose caused decreased growth and anemia in chicks (same or similar test animals as in Dewar et al. 1983). Table 3-7 in URS (2001) proposes a chronic NOAEL of 16.0 mg/kg BW/day, and a chronic LOAEL of 48.0 mg/kg BW/day, based on TRV data in Sample et al. (1996).

Response to TRV Inquiry #7:

Stahl (1990) was reviewed by ERT and summarized in the TRV write-up we provided you. For this study no significant effect on chick growth or feather fraying was observed at maternal dietary exposure concentrations of 0, 20, 200 or 2000 mg/kg. Anemia was not evaluated.

We also obtained the Stahl (1989) publication. A significant decrease in growth was observed in chicks exposed to dietary zinc at a concentration of 2183 mg/kg for 21 days; no effect of growth was observed at 103 mg/kg. In addition to growth, excretion, immune response, and iron and copper utilization were measured. Anemia was not evaluated. We averaged the food ingestion rates and body weights cited inU.S. EPA 1988 for 7, 14, and 21-day old chicks (0.0075, 0.0126 and 0.019 kg/day and 0.066, 0.121 and 0.193 kg) to convert the concentration at which decreased growth was observed to units of mg/kgBW/day (0.013 kg/day and 0.127 kg). A LOAEL of 223.5 and a NOAEL of 10.5 were calculated. These values will be used as the bird TRVs for zinc instead of the values from Dewar et al. (1983). The revised TRV for zinc is provided below.

Zinc

White leghorn hens were fed diets containing zinc (as zinc oxide) at concentrations of 0 or 20,000 mg/kg for five days (Palafox and Ho-A 1980). All birds were fed the basal diet from 5 days to 12 weeks. Fertility and hatchability of eggs laid by zinc-treated hens collected 14 to 28 days after the 5-day feeding period were significantly decreased compared to those laid by control birds. Egg production and body weight of zinc-treated birds were also significantly depressed from 0 to 4 weeks. An ingestion rate of 0.103 kg/day and body weight of 1.45 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 1420 and an estimated NOAEL of 142 mg/kgBW/day were calculated based on the results of this experiment.

Stahl et al. (1990) exposed white leghorn hens to a basal diet (28 mg/kg zinc) supplemented with 20, 200 or 2000 mg/kg zinc as zinc sulfate for 44 weeks. No significant effects on fertility, hatchability, progeny growth to 3 weeks of age or zinc-related feather fraying were observed at any exposure concentration. An ingestion rate of 0.109 kg/day and body weight of 1.912 kg (cited by authors for the 2028 mg/kg dose group) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 114 mg/kgBW/day and an estimated LOAEL of 1114 mg/kgBW/day were calculated based on the results of this experiment.

Mallard ducks were fed diets containing supplemental zinc (as zinc carbonate) at concentrations of 0, 3,000, 6,000, 9,000 or 12,000 mg/kg for 60 days (Gasaway and Buss 1972). The zinc concentration of the basal diet, a pelleted chicken developer-turkey finisher, was 250 mg/kg. To convert the exposure concentrations to a wet weight basis, a

7.5 percent moisture content cited for a chick developer diet (Street 1978) was used, resulting in exposure concentrations of 231 (control), 3006, 5550, 8556 and 11331 mg/kg. Food consumption of treated birds decreased immediately after being placed on the zinc-treated pellets; food consumption was inversely related to the concentration of zinc in the diet. In all birds fed zinc-supplemented diets, leg paralysis, diarrhea and weight loss were observed within 10 days. The gonads of zinc-treated birds were so reduced in size reproductive function may have been lost. Two of six birds fed zinc at a concentration of 3000 mg/kg survived to the end of the experiment; all other experimental birds died. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 938 mg/kgBW/day and an estimated NOAEL of 93.8 mg/kgBW/day were calculated based on the results of this experiment.

Three-day old mallard ducklings were fed diets containing zinc (as zinc sulfate) at concentrations of 0 or 2500 mg/kg for 56 days (Kazacos and Van Vleet 1989). An additional control group was fed measured amounts of basal diet based on the lowest average daily food intake of ducklings in the zinc group. Ducklings were removed from the experimental groups and pancreatic tissue was examined to evaluate zinc-related pancreatic alterations over time. Ultrastructural features of the pancreas from the inanition control group were similar to those of the control group. Pancreatic atrophy due to decreased number and size of acinar cells was observed in zinc-treated ducklings. An ingestion rate of 0.0748 kg/day and body weight of 0.572 kg (Sugden et al. 1981; value cited for 4-week old ducklings) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 327 mg/kgBW/day and an estimated NOAEL of 32.7 mg/kgBW/day were calculated based on the results of this experiment.

The effects of dietary zinc on pancreatic function were evaluated in day-old chicks (Lu and Combs 1988). Chicks were fed a purified basal diet supplemented with 0, 500 or 1000 mg/kg zinc (as zinc oxide) for 9 days. Actual measured zinc concentrations in the diet were 87, 630 and 1060 mg/kg zinc. The purified diet was selenium -deficient (0.01 mg Se/kg); selenium is important in maintenance of pancreatic exocrine function in the chick. Growth rate, food intake and food utilization efficiency were significantly decreased in chicks fed zinc at a concentration of 1000 mg/kg. Activities of pancreatic exportable enzymes were decreased, and these reductions were associated with reductions in digestibility of dietary starch. Similar effects were not observed in chicks fed a nonpurified diet supplemented with 2000 mg/kg for 20 days. The experiments demonstrated that the pancreas is a target organ of zinc toxicity in the chick, and that dietary factors that increase the bioavailability of zinc affect the concentration at which toxic effects are observed. Food ingestion rates of 5.5 and 5.9 g/day and body weights of 46.7 and 48.5 g (cited by authors for 1060 and 630 mg/kg exposure groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 125 mg/kgBW/day and a NOAEL of 77 mg/kgBW/day were calculated based on the results of this experiment. This experiment was not used to derive TRVs for this risk assessment, because adverse growth effects were only observed when chicks were fed selenium-deficient diets.

Fourteen-day old female broiler chicks were fed diets containing supplemental zinc (as zinc oxide) at concentrations of 0, 2000, 4000 or 6000 mg/kg for 42 days (Dewar et al 1983). The basal diet contained 101 mg zinc/kg. Mortality was high in chicks fed the high zinc diet. Growth was significantly depressed in all chicks fed the zinc supplemented diets, and gizzard erosion and pancreatic lesions were observed in many chicks upon histopathological examination. Due to excessive food spillage, food consumption could not be measured accurately in this experiment. In a second experiment, 1-day old chicks were fed diets containing 0, 1000, 2000 or 4000 mg/kg supplemental zinc for 28 days. High mortality was observed in the 4000 mg/kg group, and growth was significantly decreased in the chicks fed zinc at concentrations of 2000 or 4000 mg/kg. Pancreatic lesions were found in all chicks fed zinc supplemented diets during this experiment, and gizzard erosion was observed in the two higher concentration groups. Based on adverse effects on growth, a LOAEL of 2000 mg/kg and a NOAEL of 1000 mg/kg supplemental zinc were identified. Ingestion rates of 0.04 and 0.044 kg/day and body weights of 0.308 and 0.335 kg (cited by authors for the 2000 and 1000 mg/kg experimental groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 273 mg/kgBW/day and a NOAEL of 145 mg/kgBW/day were calculated based on the results of this experiment.

One-day old chicks (New Hampshire X Single Comb White Leghorn) were fed diets containing zinc at concentrations of 37 (control), 103, or 2183 mg/kg for 21 days (Stahl et al 1989). A significant decreased in growth was observed in chicks exposed to dietary zinc at a concentration of 2183 mg/kg for 21 days; no effect on growth was observed at 103 mg/kg. In addition to growth, excretion, immune response, and iron and copper utilization were measured. Chicks fed the two experimental diets excreted more zinc than control birds. Tissue concentrations of zinc were similar to control birds in the 103 mg/kg exposure group, while the highest exposure group accumulated zinc in their tissues. Immune responses were not affected by zinc exposure. Iron and copper utilization were affected in birds fed the highest Zn diet, however effects were also seen in pair-fed birds and may have been due to reduced food intake or growth. The average food ingestion rates and body weights cited in U.S. EPA 1988 for 7, 14, and 21-day old chicks (0.0075, 0.0126 and 0.019 kg/day and 0.066, 0.121 and 0.193 kg) were used to convert the concentration at which decreased growth was observed to units of mg/kgBW/day (0.013 kg/day and 0.127 kg). A LOAEL of 223.5 and a NOAEL of 10.5 were calculated and will be used to evaluate effects of zinc exposure to birds.

B. Draft Receptor Life History Profiles (LHP):

LHP Inquiry #1:

1) General Comments*:*
We recommend reviewing references presented in Table 3-5 of URS (2001), including Beyer et al. (1994), USEPA (1993) and others, for additional exposure profile information where the subject document states that no information was available. For example:

- the subject document states that no information could be found for the food ingestion rate of the meadow vole. USEPA (1993) gives food ingestion data for meadow voles.
- URS (2001) proposed a sediment ingestion rate of 5% for muskrats, adapted from Beyer et al. (1994), a more conservative value than the 3.75% proposed in the subject document.
- URS (2001) proposed various exposure factors for bobcats, based on cited literature. These references should be reviewed in addition to those proposed in the subject document.
- URS (2001) proposed a sediment ingestion rate of 4% for mink, adapted from Beyer et al. (1994).
- URS (2001) proposed various exposure factors for cliff swallows, based on Beyer et al. (1994), USEPA (1993) and others. These references should be reviewed in addition to those proposed in the subject document.
- URS (2001) proposed various exposure factors for common snipe, based on Beyer et al. (1994), USEPA (1993) and others. These references should be reviewed in addition to those proposed in the subject document.
- Beyer et al. (1994) may also be an appropriate reference for evaluating sediment ingestion rates in song sparrows.
- URS (2001) gives additional references, including Beyer et al. (1994) and USEPA (1993), for the ruffed grouse, which may be helpful when developing exposure factors for the spruce grouse.

Response to LHP Inquiry #1:

General Comment: Hierarchy of Selection Process for Life History Parameters (This topic is also addressed in the section “Specific Concern # 1" of the Memorandum from the Spokane Tribe of Indians/AESE, Inc.).

Whenever possible, measured, species-specific ingestion rates from field populations were used to develop exposure profiles. If such data are not available, rates from laboratory populations of the species in question were used, because of possible differences in behavior, physiology, diet, and ecology between even closely related species. When a species-specific rate could not be found, a published ingestion rate for a closely related species was used, followed by allometric equations derived by Nagy (1987) and Calder and Braun (1983). The latter provide only predictive equations based on a review of a wide range of species and, we believe, are less likely to accurately express species-specific ingestion rates than are empirically derived measures, even ones from surrogate species (if those surrogates are closely related to the species being modeled).

Beyer et al. (1994) and U.S. EPA (1993a,b) were included as potential sources of intake rates for all species. However, U.S. EPA (1993a,b) presents a compilation of data from other sources; in all cases, the original references were obtained to verify any information presented in U.S. EPA (1993a,b). Thus, the U.S. EPA documents are not cited when they are not the original source of the information. In addition, the information presented in U.S. EPA (1993a,b) was, in some cases, found to be incorrect or modified from that of the original document (e.g., an ingestion rate for meadow voles [Ognev 1950], as cited by Johnson and Johnson [1982], is actually an intake rate for herbivores, not specifically meadow voles). Finally, intake rates presented in units of amount per day were preferred over those given on a per unit body weight per day basis, as the food-chain models already incorporate body weights. If a source provided both intake rates on a per unit body weight per day basis and body weights of species, the intake rates in amount per day could be calculated, but in some instances, documents cited in U.S. EPA (1993a,b) were not used because such information was not available.

Specific concerns:

Meadow vole: The food ingestion rate for the meadow vole has been revised. Several documents providing species-specific ingestion rates were found and incorporated into the life history profile. The revised paragraph describing derivation of food ingestion rates for the meadow vole can be found in the section responding to concerns of the Spokane Tribe of Indians/AESE, Inc.

Muskrat: URS (2001b) proposed a sediment ingestion rate of 5% for muskrats, adapted from Beyer et al. (1994), a more conservative value than the 3.75% found in the literature. URS (2001b) states that the value of 5% was estimated from diet and soil/sediment information. Without access to the diet and soil/sediment information used to derive the value of 5%, or a review of the method by which that value was obtained, we feel that changing the 3.75% sediment ingestion rate is not warranted.

Bobcats: The suggested references were included in our literature reviews.

Mink: ERT is unable to justify the sediment ingestion rate of 4% for mink, adapted from Beyer et al. (1994) for several reasons. One is that mink are not included in the survey presented by Beyer et al (1994) and no species listed in Beyer et al (1994) had a soil ingestion rate of 4%. In addition, the mink is not a close relative nor has a diet similar to other species listed in that reference that would allow a reasonable extrapolation. ERT does believe, given that the main component of the mink's diet is fish, the method selected to calculate soil ingestion (using estimates of the sediment entrained in the digestive system of the bluegill, a prey species of the mink) that it provides a realistic representation of the amount of soil ingested by mink.

URS (2001b) proposed a sediment ingestion rate of 4% for mink, adapted from Beyer et al. (1994). URS (2001b) states that the value was estimated from diet and soil/sediment information. Without access to the diet and soil/sediment information used to derive the value of 4%, or a review of the method by which that value was obtained, we feel that changing the current sediment ingestion rate is not warranted.

Cliff swallows: The suggested references were included in our literature reviews.

Wilson's snipe: The suggested references were included in our literature reviews.

Song sparrow: The suggested references were included in our literature reviews.

Spruce grouse: This life history is complete and the suggested references are included in literature reviews. However, it should be noted that the diet of ruffed grouse and spruce grouse are considerably different, since the spruce grouse consumes primarily pine and spruce needles and the ruffed grouse consumes mainly herbivorous vegetation, insects, fruits, and seeds. The Beyer et al (1994) reference used the turkey to estimate soil ingestion rate of the Spruce grouse which is what we used in our life history. The ruffed grouse is not listed in U.S. EPA (1993).

LHP Inquiry #2:

2) White-tailed deer:

The subject document reports a water ingestion rate of 3.61 L/day from the literature reviewed, and proposes this value for both the conservative and representative rates. Was this the highest value found in the literature or was it an average value reported in the study cited? URS (2001) establishes a calculated water ingestion rate of 4.68 L/day.

The proposed sediment ingestion rate for white-tailed deer is 5.8%. However, ingestion rates for a specific site may be altered from the expected average rate if there is a specific feature at the site that attracts the deer to high-sediment areas. For example, deer may be attracted to the pit areas at Midnite Mine by the presence of large areas of exposed salts, in addition to the water source. It is possible that deer obtaining salts at these pit areas would ingest higher-than-average amounts of sediments. Also, will the elevated concentrations of contaminants reported in these pit sediments/salts be used to evaluate exposure of the deer?

Response to LHP Inquiry #2:

Water ingestion rates: The life history of the white-tailed deer has been modified and now includes more conservative water ingestion rates (taken from Lautier et al. 1988). See the section responding to concerns of the Spokane Tribe of Indians/AESE, Inc., for additional information.

Soil ingestion rates: Additional references have been requested for review to see if it should be revised. ` It should be noted, however, that while it is certainly possible that site-specific soil ingestion rates may be higher than the maximum measured rates presented in the literature, this issue cannot be addressed in the exposure profile (or the food chain models) without site-specific numbers. With respect to the use of salts by deer, elk or other mammals, we will try to add this to the exposure model, however, we are not certain what information exists which will allow us to determine rates. If we can not determine an ingestion rate for these materials we will at least highlight this issue within the risk characterization.

LHP Inquiry #3:

3) Masked shrew*:*

Table 3-5 from URS (2001) also used a sediment ingestion rate of a short-tailed shrew to represent that of a masked shrew. However, the table reports a sediment ingestion rate of a short-tailed shrew as 13%, compared to the 5.2% given in the subject document. The reference given in the table should also be evaluated, in light of this discrepancy.

Response to LHP Inquiry #3:

URS (2001b) proposes a sediment ingestion rate of 13% for masked shrew, cited as being taken from CH2m Hill 2000? (Talmage and Watson). This reference was not listed in the reference cited for the table or the comments. ERT will attempt to obtain this reference and review it to determine if the soil ingestion rate for the masked shrew should be revised.

LHP Inquiry #4:

4) Mallard*:*
Beyer et al. (1998) establishes a more conservative sediment ingestion rate of 11.7%, based on large numbers of mallard fecal samples collected from various wetland habitats over a three year period. We recommend use of this value over the Beyer et al. (1994) value.

Response to LHP Inquiry #4:

The Beyer et al (1998) document does provide a 11.7% value, but this value is not for sediment ingestion, but rather the value represents the acid insoluble ash content in feces which must be converted to the soil ingestion rate using the formula presented in Beyer et al (1994). ERT did revise its soil ingestion rate for mallards to read as follows:

> *Beyer et al. (1994) presented a soil ingestion rate for the mallard of 3.3 percent of the total diet. Measures of the acid insoluble ash content in mallard feces presented in Beyer et al. (1998) yield soil ingestion estimates (calculated using the formula presented in Beyer et al. 1994) ranging from 0 to 53 percent of the diet (mean = 4.9%). The highest value (53%) was used as a conservative estimate of soil ingestion; the average of the means (4.1%) was used as a representative estimate of soil ingestion. These values were multiplied by the food ingestion rates above to yield conservative and representative soil ingestion rates of 0.0737 and 0.0046 kg/day, respectively.*

LHP Inquiry #5:

5) Great blue heron and bald eagle:
The risk assessment should acknowledge that great blue herons and bald eagles are not strictly piscivorous, and should state the reasons for modeling them as piscivorous for the purposes of this risk assessment.

Response to LHP Inquiry #5:

It has been noted in the life histories that these birds are not strictly piscivorous. The diet of the bald eagle will vary depending on the availability of prey at a particular location. For example, as cited in the life history profiles, in Texas the bald eagle diet was comprised of 30.1 % fish, 5.5% mammals, 33.7% birds, and 30.7 % reptiles while in Arizona the diet was comprised of

75.5% fish, 14.3% mammals and 10.2% birds. Great blue herons are opportunistic predators, and will consume whatever prey are available, but fish are the preferred food items. Several citations in the life history profile for the great blue heron indicate that the fish diet can vary from 70% to greater than 90%.

For this ERA it was decided to treat both the bald eagle and the blue heron as receptors that consume 100% fish to maximize potential risks to the piscivorous avian communities.

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Appendix B - Statistical Methods for Calculating Central Tendency
Midnite Mine Site
Wellpinit, Washington

Statistical Methods for Calculating Central Tendency of Midnite Mine Data

In addition to simply listing the number of samples, the number of detects, and the minimum/maximum concentrations, per matrix, per location, per analyte, for the Midnite Mine data, REAC wants to record a measure of central tendency for descriptive purposes. A measure of central tendency is a number defining the approximate center of the population distribution of any given parameter (in this case analytical concentrations). The most common measures of central tendency utilized are the mean and median.

The Midnite Mine data presented several challenges in choosing an appropriate measure of central tendency. The samples were collected over several years by multiple contractors. In addition to the variability presented by those two factors, many of the sample populations contained large percentages of below sample detection limit values (SDLs) and many had small sample sizes (<=20).

There are several methods for calculating measures of central tendency for data sets that contain values below a detection limit or non-detect (ND) values. There are several statistical methods for calculating a mean, such as the Winsorized or Trimmed mean, but these methods are not advantageous when large percentages of NDs exist. Non-detects can also be replaced with the SDL, a percentage of the SDL, or zero, prior to calculating a mean or a median. In doing so, a known bias is introduced into the calculations. This method is frequently used within the environmental industry and in most cases 50% of the SDL is the calculated replacement value when dealing with metals. This replacement method can be used for data sets with no greater than 90% NDs and a coefficient of variation less than 100% and will still reflect a good measure of central tendency.

Regardless of the number of NDs, the mean can only be considered a good measure of central tendency when the population distribution is normal. If the data follow a normal distribution, the mean and the median would be equivalent. In cases where the data does not follow a normal distribution, the median can be a better measure of central tendency. The median is considered to be a robust estimate of central tendency, and "can be estimated if even almost half the data set consists of NDs....the sample median will tend to be smaller than the true mean μ if the distribution is skewed to the right and larger than the true mean if the distribution is skewed to the left."(Gilbert 1987).

Given the nature of this data (multiple contractors, the elapsed time between sampling events, etc.) it is unlikely that the data sets will follow a normal distribution. Given the number of non-detects, it can be expected that many of the sample distributions will be skewed to the left. Given that these calculated measures of central tendency will not be used for anything other than exploratory purposes and given all of the above considerations, the following method for calculating measures of central tendency was recommended for the Midnite Mine data sets:

For Sample Sizes $\geq$20:

1) Calculate the mean, replacing NDs with 50% of the SDL
2) If there are fewer than 40% NDs for a given data set, a median will also be calculated replacing the NDs with 50% of the SDL
3) If there are greater than 90% NDs for a given data set, no measure of central tendency will be calculated

For Sample Sizes <20:

1) Calculate the mean, replacing NDs with 50% of the SDL
2) If there are greater than 90% NDs, no measure of central tendency will be calculated

CITATION

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Appendix C - Surface Water Benchmark Calculation for Uranium
Midnite Mine Site
Wellpinit, Washington

Appendix C - Surface Water Benchmark Calculations for Uranium

The surface water benchmark (BM) for uranium (U) is based on the two median lethal concentrations (LC_{50}) determinations for brook trout derived from "An Environmental Hazard Evaluation of Uranium In A Rocky Mountain Stream" (Parkhurst, *et al.* 1984). The acute toxicity data from this publication is used for establishing the toxicological BM for elemental U (Suter, *et al.* 1996). Parkhurst, *et al.* (1984) presents two acute 96 hr LC_{50}'s of 5,500 micrograms per liter (µg/L) at a water hardness of 35 parts per million (ppm) as calcium carbonate ($CaCO_3$) and 23,000 µg/L at a hardness of 208 ppm for brook trout (*Salvelinus fontinalis)*. A 77-day chronic bioassay using brook trout was also conducted in this study, but the highest concentration (9,000 µg/L) did not cause an effect on egg hatching or growth of the fry. Since this chronic study did not define a specific NOAEL (No Observable Adverse Effect Level) or LOAEL (Lowest Observable Adverse Effect Level), it was not applied in the calculations for the BM value.

The two LC_{50} determinations were applied to a Tier II National Water Quality Criteria (NWQC) procedure for defining a toxicological BM for elemental U. This Tier II procedure (Stephan *et al.* 1985) for deriving water quality criteria is applied when data requirements for a Tier I criteria cannot be met. A Tier I criteria requires at least eight acute data points or at least three chronic studies for different species. When these data requirements are not met, then a Tier II calculation using various application factors for "margins of safety" can be applied.

Tier II calculation for U is as follows:

1) Trout LC_{50} = 5,500 µg/L (hardness of 35 ppm)
Trout LC_{50} = 23,000 µg/L (hardness of 208 ppm)

   Genus Mean of the Acute Values (GMAV) = 11,250 µg/L (calculated as a geometric mean)

2) Secondary Acute Value (SAV) is determined by dividing a Final Acute Factor (FAVR) into the lowest GMAV. The FAVR is an application factor that is applied based on whether a daphnid species was tested and how many genera are represented in the toxicity assessments. For U the highest FAVR of 242 was applied since daphnid testing was not represented and only one genera was represented.

   SAV= GMAV / FAVR = 11,250 / 242 = 46.48

3) Secondary Acute to Chronic Ratio (SACR) is derived based on the available chronic values. If no chronic values exist, then a default value of 17.9 is applied.

4) Secondary Chronic Value (SCV) is the final calculation that establishes the BM. The SCV is calculated by dividing the SAV by the SACR.

   SCV = SAV / SACR = 46.48 / 17.9 = 2.6 µg/L as U

When comparing this BM value of 2.6 µg/L with the 77 day chronic trout study where the NOAEL was greater than 9,000 µg/L, a significant "margin of safety" between the calculated BM value and the experimental data is implied.

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Appendix D - Surface Water Screening Tables
Midnite Mine Site
Wellpinit, Washington

Table D-1. Identification of COPC as Total Metals in Surface Water for Pit 3
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	12	12	46,800	61,433	92,300	87	1,061	Yes	HQ>1
Antimony, total	4	1	2	2	2	30	0.1	No	HQ<1
Arsenic, total	12	7	5	11	16.3	150	0.1	No	HQ<1
Barium, total	12	10	6.5	21	48.2	3.9	12.4	Yes	HQ>1
Beryllium, total	12	12	4	35	50	0.53	94	Yes	HQ>1
Cadmium, total[a]	13	13	26	43	70	0.12	583	Yes	HQ>1
Chromium, total[b]	12	6	0.2	8	34.3	10	3.4	Yes	HQ>1
Cobalt, total	4	4	900	1,004	1,100	3	367	Yes	HQ>1
Copper, total[a]	13	9	160	313	286	3.2	89	Yes	HQ>1
Iron, total	12	12	120	997	5060	1,000	5.1	Yes	HQ>1
Lead, total[a]	12	10	2	12	39.4	0.7	56	Yes	HQ>1
Magnesium, total	3	3	300,000	320,666	342,000	82,000	4.2	Yes	HQ>1
Manganese, total	13	13	62,200	88,253	120,000	80	1,500	Yes	HQ>1
Mercury, total[c]	12	0	ND (0.2)	nc	ND (0.2)	0.77	nd	No	BM>ND
Mercury, total[d]	12	0	ND (0.2)	nc	ND (0.2)	0.012	nd	Yes	BM<ND
Nickel, total[a]	12	12	20	1,553	2,430	19	128	Yes	HQ>1
Selenium, total	12	3	49.8	15	65.3	5	13.1	Yes	HQ>1
Silver, total	12	2	50	15	60	0.08	750	Yes	HQ>1
Thallium, total	12	2	0.2	1	0.2	4	0.1	No	HQ<1
Uranium, total	11	11	2,000	17,554	24,000	2.6	9,231	Yes	HQ>1
Vanadium, total	4	0	ND (1)	nc	ND (1)	19	nd	No	BM>ND
Zinc, total[a]	13	13	2,500	3,539	5,480	41	134	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-2. Identification of COPC as Total Metals in Surface Water for Pit 4
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	11	9	80	169	500	87	5.7	Yes	HQ>1
Antimony, total	3	0	ND (5)	nc	ND (5)	30	nd	No	BM>ND
Arsenic, total	11	1	1	nc	1	150	<0.01	No	HQ<1
Barium, total	11	11	4.3	6	8	3.9	2.1	Yes	HQ>1
Beryllium, total	11	2	1	2	14	0.53	26	Yes	HQ>1
Cadmium, total[a]	12	1	0.2	nc	0.2	0.12	1.7	Yes	HQ>1
Chromium, total[b]	11	1	2.3	nc	2.3	10	0.2	No	HQ<1
Cobalt, total	3	2	1.1	1	2.5	3	0.8	No	HQ<1
Copper, total[a]	12	9	2	7	23.1	3.2	7.2	Yes	HQ>1
Iron, total	11	9	60	138	539	1,000	0.5	No	HQ<1
Lead, total[a]	11	3	2.4	2	7.3	0.7	10.4	Yes	HQ>1
Magnesium, total	3	3	21,600	24,666	27,700	82,000	0.3	No	HQ<1
Manganese, total	12	12	262	660	880	80	11	Yes	HQ>1
Mercury, total[c]	11	0	ND (0.2)	nc	ND (0.2)	0.77	nd	No	BM>ND
Mercury, total[d]	11	0	ND (0.2)	nc	ND (0.2)	0.012	nd	Yes	BM<ND
Nickel, total[a]	11	8	10	73	660	19	35	Yes	HQ>1
Selenium, total	11	1	3	nc	3	5	0.6	No	HQ<1
Silver, total	11	1	10	nc	10	0.08	125	Yes	HQ>1
Thallium, total	11	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Uranium, total	11	11	1,320	2,596	3,300	2.6	1,269	Yes	HQ>1
Vanadium, total	3	0	ND (1)	nc	ND (1)	19	nd	No	BM>ND
Zinc, total[a]	12	8	7	19	60	41	1.5	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-3. Identification of COPC as Total Metals in Surface Water for Blood Pool
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	7	7	4320	69,070	116,000	87	1,333	Yes	HQ>1
Antimony, total	2	0	ND (5)	nc	ND (5)	30	nd	No	BM>ND
Arsenic, total	7	3	5	4.8	7.1	150	<0.01	No	HQ<1
Barium, total	7	6	3	8.9	22	3.9	5.6	Yes	HQ>1
Beryllium, total	7	6	3	16.6	27.8	0.53	52.5	Yes	HQ>1
Cadmium, total[a]	7	7	1.2	5.9	9	0.12	75.0	Yes	HQ>1
Chromium, total[b]	7	7	1	16.5	27.4	10	2.7	Yes	HQ>1
Cobalt, total	2	2	714	753	792	3	264	Yes	HQ>1
Copper, total[a]	7	7	67	743	1,190	3.2	372	Yes	HQ>1
Iron, total	7	7	610	5,648	16,600	1,000	16.6	Yes	HQ>1
Lead, total[a]	7	4	0.8	4.0	12.5	0.7	17.9	Yes	HQ>1
Magnesium, total	2	2	163,000	173,000	183,000	82,000	2.2	Yes	HQ>1
Manganese, total	7	7	3560	24,210	36,800	80	460	Yes	HQ>1
Mercury, total[c]	7	1	ND (0.2)	0.1	0.2	0.77	0.3	No	HQ<1
Mercury, total[d]	7	1	ND (0.2)	0.1	0.2	0.012	16.7	Yes	HQ>1
Nickel, total[a]	7	7	110	777	1260	19	66.3	Yes	HQ>1
Selenium, total	7	5	1	7.5	27.2	5	5.4	Yes	HQ>1
Silver, total	7	0	ND (2)	nc	ND (2)	0.08	nd	Yes	BM<ND
Thallium, total	7	0	ND (0.2)	nc	ND (0.2)	4	nd	No	BM>ND
Uranium, total	7	7	1980	5,199	8,170	2.6	3,142	Yes	HQ>1
Vanadium, total	2	0	ND (1)	nc	ND (1)	19	nd	No	BM>ND
Zinc, total[a]	7	7	130	734	1,330	41	32.4	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-4. Identification of COPC as Total Metals in Surface Water for Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	18	18	26,900	73,733	120,000	87	1,379	Yes	HQ>1
Antimony, total	3	0	ND (5)	nc	ND (5)	30	nd	No	BM>ND
Arsenic, total	18	7	6	9.4	17.5	150	0.1	No	HQ<1
Barium, total	18	18	2.1	8.8	12.1	3.9	3.1	Yes	HQ>1
Beryllium, total	18	18	16	38.8	60	0.53	113	Yes	HQ>1
Cadmium, total[a]	19	19	21.2	44.5	70	0.12	583	Yes	HQ>1
Chromium, total[b]	18	10	0.5	6.4	32.6	10	3.3	Yes	HQ>1
Cobalt, total	3	3	1,000	1,196	1330	3	408	Yes	HQ>1
Copper, total[a]	19	18	96	275	384	3.2	120	Yes	HQ>1
Iron, total	18	18	90	384	1,590	1,000	1.6	Yes	HQ>1
Lead, total[a]	18	13	0.7	4.5	31	0.7	44	Yes	HQ>1
Magnesium, total	2	2	400,000	401000.0	402,000	82,000	4.9	Yes	HQ>1
Manganese, total	19	19	48,000	88963.2	142,000	80	1,775	Yes	HQ>1
Mercury, total[c]	18	1	ND (0.2)	nc	0.2	0.77	0.3	No	HQ<1
Mercury, total[d]	18	1	ND (0.2)	nc	0.2	0.012	16.7	Yes	HQ>1
Nickel, total[a]	18	18	870	1,748	2,760	19	145	Yes	HQ>1
Selenium, total	18	2	66.9	8.1	71.7	5	14.3	Yes	HQ>1
Silver, total	18	1	5	nc	5	0.08	63	Yes	HQ>1
Thallium, total	18	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Uranium, total	18	18	7,490	17,978	30,000	2.6	11,538	Yes	HQ>1
Vanadium, total	3	0	ND (1)	nc	ND (1)	19	nd	No	BM>ND
Zinc, total[a]	19	19	1,670	3,774	6,000	41	146	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-5. Identification of COPC as Total Metals in Surface Water for Outfall
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	3	3	122	235	451	87	5.2	Yes	HQ>1
Antimony, total	3	2	2.4	3.0	4	30	0.1	No	HQ<1
Arsenic, total	3	2	0.25	1.2	0.36	150	<0.01	No	HQ<1
Barium, total	3	3	56.6	66.9	78.1	3.9	20	Yes	HQ>1
Beryllium, total	3	0	ND (0.17)	nc	ND (0.17)	0.53	nd	No	BM>ND
Cadmium, total[a]	3	1	0.37	0.4	0.37	0.12	3.1	Yes	HQ>1
Chromium, total[b]	3	2	1.3	1.3	2.4	10	0.2	No	HQ<1
Cobalt, total	3	1	1.8	1.2	1.8	3	0.6	No	HQ<1
Copper, total[a]	3	1	8.4	3.1	8.4	3.2	2.6	Yes	HQ>1
Iron, total	3	1	122	47.9	122	1,000	0.1	No	HQ<1
Lead, total[a]	3	0	ND (0.9)	nc	ND (0.9)	0.7	nd	No	BM>ND
Magnesium, total	3	3	83,200	92,000	101,000	82,000	1.2	Yes	HQ>1
Manganese, total	3	3	243	296	369	80	4.6	Yes	HQ>1
Mercury, total[c]	3	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, total[d]	3	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, total[a]	3	2	1.7	2.3	3.5	19	0.2	No	HQ<1
Selenium, total	3	0	ND (1.3)	nc	ND (1.3)	5	nd	No	BM>ND
Silver, total	3	1	0.9	0.8	0.9	0.08	11.3	Yes	HQ>1
Thallium, total	3	0	ND (1.2)	nc	ND (1.2)	4	nd	No	BM>ND
Uranium, total	3	3	63	133	255	2.6	98	Yes	HQ>1
Vanadium, total	3	0	ND (0.5)	nc	ND (0.5)	19	nd	No	BM>ND
Zinc, total[a]	3	2	5.2	4.7	8.7	41	0.2	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-6. Identification of COPC as Total Metals in Surface Water for Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	16	16	170	958	4,130	87	47	Yes	HQ>1
Antimony, total	3	0	ND (1)	nc	ND (1)	30	nd	No	BM>ND
Arsenic, total	16	4	0.32	4.4	3	150	<0.1	No	HQ<1
Barium, total	16	14	14.5	26.7	58	3.9	14.9	Yes	HQ>1
Beryllium, total	16	7	1.2	2.9	4.3	0.53	8.1	Yes	HQ>1
Cadmium, total[a]	17	14	1.1	2.9	5	0.12	42	Yes	HQ>1
Chromium, total[b]	16	5	1.9	2.0	10	10	1.0	Yes	HQ=1
Cobalt, total	3	2	1.3	4.4	1.9	3	0.6	No	HQ<1
Copper, total[a]	17	12	0.81	47.2	60	3.2	18.8	Yes	HQ>1
Iron, total	16	12	20	258	3,040	1,000	3.0	Yes	HQ>1
Lead, total[a]	16	2	0.5	0.5	2.5	0.7	3.6	Yes	HQ>1
Magnesium, total	2	2	90,500	176,750	263,000	82,000	3.2	Yes	HQ>1
Manganese, total	17	17	99	8,719	15,900	80	199	Yes	HQ>1
Mercury, total[c]	16	1	ND (0.2)	nc	0.2	0.77	0.3	No	HQ<1
Mercury, total[d]	16	1	ND (0.2)	nc	0.2	0.012	16.7	Yes	HQ>1
Nickel, total[a]	16	15	90	243	400	19	21.1	Yes	HQ>1
Selenium, total	16	1	1	nc	1	5	0.2	No	HQ<1
Silver, total	16	1	5	nc	5	0.08	63	Yes	HQ>1
Thallium, total	16	1	ND (0.3)	nc	0.3	4	0.1	No	HQ<1
Uranium, Total	2	2	97	100	103	2.6	40	Yes	HQ>1
Vanadium, total	3	0	ND (0.5)	nc	ND (0.5)	19	nd	No	BM>ND
Zinc, total[a]	17	15	40	298	500	41	12.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-7. Identification of COPC as Total Metals in Surface Water for Far Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (µg/L)	Benchmark Value (BM)[3] (µg/L)	Hazard Quotient[4] (HQ)	Retained as COPC?	Rationale
Aluminum, total	1	1	1,620	87	18.6	Yes	HQ>1
Antimony, total	1	0	ND (2.7)	30	nd	No	BM>ND
Arsenic, total	1	1	1.5	150	0.01	No	HQ<1
Barium, total	1	1	53.4	3.9	13.7	Yes	HQ>1
Beryllium, total	1	1	0.17	0.53	0.3	No	HQ<1
Cadmium, total[a]	1	0	ND (0.5)	0.12	nd	Yes	BM<ND
Chromium, total[b]	1	0	ND (1.1)	10	nd	No	BM>ND
Cobalt, total	1	0	ND (1.2)	3	nd	No	BM>ND
Copper, total[a]	1	1	0.9	3.2	0.3	No	HQ<1
Iron, total	1	1	1,310	1,000	1.3	Yes	HQ>1
Lead, total[a]	1	1	1.8	0.7	2.6	Yes	HQ>1
Magnesium, total	1	1	4,090	82,000	<0.1	No	HQ<1
Manganese, total	1	1	21.1	80	0.3	No	HQ<1
Mercury, total[c]	1	0	ND (0.1)	0.77	nd	No	BM>ND
Mercury, total[d]	1	0	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, total[a]	1	1	2.2	19	0.1	No	HQ<1
Selenium, total	1	0	ND (1.3)	5	nd	No	BM>ND
Silver, total	1	0	ND (0.8)	0.08	nd	Yes	BM<ND
Thallium, total	1	0	ND (1.2)	4	nd	No	BM>ND
Uranium, Total	1	1	10	2.6	3.8	Yes	HQ>1
Vanadium, total	1	1	4.5	19	0.2	No	HQ<1
Zinc, total[a]	1	1	5.8	41	0.1	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-8. Identification of COPC as Total Metals in Surface Water for Northeastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (µg/L)	Benchmark Value (BM)[3] (µg/L)	Hazard Quotient[4] (HQ)	Retained as COPC?	Rationale
Aluminum, total	1	1	41,100	87	472	Yes	HQ>1
Antimony, total	1	1	4.7	30	0.2	No	HQ<1
Arsenic, total	1	1	4.2	150	<0.1	No	HQ<1
Barium, total	1	1	145	3.9	37	Yes	HQ>1
Beryllium, total	1	1	6.6	0.53	12.5	Yes	HQ>1
Cadmium, total[a]	1	0	ND (0.5)	0.12	nd	No	BM<ND
Chromium, total[b]	1	1	33.4	10	3.3	Yes	HQ>1
Cobalt, total	1	1	23.3	3	7.8	Yes	HQ>1
Copper, total[a]	1	1	54.9	3.2	17.2	Yes	HQ>1
Iron, total	1	1	66,000	1,000	66	Yes	HQ>1
Lead, total[a]	1	1	23	0.7	33	Yes	HQ>1
Magnesium, total	1	1	6,360	82,000	0.1	No	HQ<1
Manganese, total	1	1	654	80	8.2	Yes	HQ>1
Mercury, total[c]	1	0	ND (0.1)	0.77	nd	No	BM>ND
Mercury, total[d]	1	0	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, total[a]	1	1	73.1	19	3.8	Yes	HQ>1
Selenium, total	1	0	ND (1.3)	5	nd	No	BM>ND
Silver, total	1	0	ND (0.8)	0.08	nd	Yes	BM<ND
Thallium, total	1	0	ND (1.2)	4	nd	No	BM>ND
Uranium, Total	1	1	1,070	2.6	412	Yes	HQ>1
Vanadium, total	1	1	60.7	19	3.2	Yes	HQ>1
Zinc, total[a]	1	1	62.9	41	1.5	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-9. Identification of COPC as Total Metals in Surface Water for Central Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	16	16	830	1,397	1,720	87	20	Yes	HQ>1
Antimony, total	3	0	ND (0.5)	nc	ND (0.5)	30	nd	No	BM>ND
Arsenic, total	16	2	0.67	2.7	0.7	150	<0.1	No	HQ<1
Barium, total	16	16	2.1	12.6	16.5	3.9	4.2	Yes	HQ>1
Beryllium, total	16	4	2.8	2.3	3.2	0.53	6.0	Yes	HQ>1
Cadmium, total[a]	17	17	8.9	39.7	53	0.12	442	Yes	HQ>1
Chromium, totalb	16	3	0.2	7.2	8.1	10	0.8	No	HQ<1
Cobalt, total	3	3	41.3	51.6	60	3	20	Yes	HQ>1
Copper, total[a]	17	15	1.4	50.8	80	3.2	25	Yes	HQ>1
Iron, total	16	11	10	57.3	450	1,000	0.5	No	HQ<1
Lead, total[a]	16	0	ND (0.2)	nc	ND (0.2)	0.7	nd	No	BM>ND
Magnesium, total	2	2	189,000	228,500	268,000	82,000	3.3	Yes	HQ>1
Manganese, total	17	17	40,100	71,524	91,200	80	1,140	Yes	HQ>1
Mercury, total[c]	16	1	ND (0.2)	nc	0.2	0.77	0.3	No	HQ<1
Mercury, total[d]	16	1	ND (0.2)	nc	0.2	0.012	16.7	Yes	HQ>1
Nickel, total[a]	16	16	790	1,103	1,380	19	73	Yes	HQ>1
Selenium, total	16	0	ND (1)	nc	ND (1)	5	nd	No	BM>ND
Silver, total	16	3	2.1	4.7	10	0.08	125	Yes	HQ>1
Thallium, total	16	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Uranium, total	2	2	5	366	727	2.6	280	Yes	HQ>1
Vanadium, total	3	1	0.51	2.0	0.51	19	<0.1	No	HQ<1
Zinc, total[a]	17	16	710	1,160	3,000	41	73	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-10. Identification of COPC as Total Metals in Surface Water for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	35	32	36.1	*200*	2,150	87	25	Yes	HQ>1
Antimony, total	16	3	3	1.9	4.8	30	0.2	No	HQ<1
Arsenic, total	35	21	0.88	*2.5*	9.3	150	0.1	No	HQ<1
Barium, total	35	35	19	*54.9*	105	3.9	27	Yes	HQ>1
Beryllium, total	35	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, total[a]	37	8	0.2	0.9	4.4	0.12	37	Yes	HQ>1
Chromium, total[b]	35	16	0.5	2.0	16.9	10	1.7	Yes	HQ>1
Cobalt, total	16	3	1.4	0.8	2.4	3	0.8	No	HQ<1
Copper, total[a]	37	23	0.99	*4.4*	51	3.2	15.9	Yes	HQ>1
Iron, total	35	25	20	*80*	3,920	1,000	3.9	Yes	HQ>1
Lead, total[a]	35	4	0.3	0.7	5.9	0.7	8.4	Yes	HQ>1
Magnesium, total	16	16	28,500	77,725	117,000	82,000	1.4	Yes	HQ>1
Manganese, total	37	37	4.3	*94.4*	15,900	80	199	Yes	HQ>1
Mercury, total[c]	35	1	ND (0.1)	nc	0.1	0.77	0.1	No	HQ<1
Mercury, total[d]	35	1	ND (0.1)	nc	0.1	0.012	8.3	Yes	HQ>1
Nickel, total[a]	35	12	0.91	25.9	320	19	16.8	Yes	HQ>1
Selenium, total	35	0	ND (1)	nc	ND (1)	5	nd	No	BM>ND
Silver, total	35	2	0.7	nc	10	0.08	125	Yes	HQ>1
Thallium, total	35	1	1.5	nc	1.5	4	0.4	No	HQ<1
Uranium, total	24	24	30	*50.5*	130	2.6	50	Yes	HQ>1
Vanadium, total	16	9	0.95	1.4	8.2	19	0.4	No	HQ<1
Zinc, total[a]	37	18	2.9	29.7	380	41	9.3	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-11. Identification of COPC as Total Metals in Surface Water for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	15	12	70	242	1180	87	13.6	Yes	HQ>1
Antimony, total	6	1	ND (2.2)	1.8	2.2	30	0.1	No	HQ<1
Arsenic, total	15	5	1.1	2.3	2	150	<0.1	No	HQ<1
Barium, total	15	15	16.6	44.7	77	3.9	19.7	Yes	HQ>1
Beryllium, total	15	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, total[a]	16	9	0.21	1.3	2.6	0.12	21.7	Yes	HQ>1
Chromium, total[b]	15	10	0.4	1.6	7.3	10	0.7	No	HQ<1
Cobalt, total	6	1	1.4	0.7	1.4	3	0.5	No	HQ<1
Copper, total[a]	16	11	2.7	10.4	47	3.2	14.7	Yes	HQ>1
Iron, total	15	12	20	118	618	1,000	0.6	No	HQ<1
Lead, total[a]	15	3	2	0.8	2.7	0.7	3.9	Yes	HQ>1
Magnesium, total	6	6	63,200	87,783	99,700	82,000	1.2	Yes	HQ>1
Manganese, total	16	16	364	1,846	4740	80	59	Yes	HQ>1
Mercury, total[c]	15	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, total[d]	15	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, total[a]	15	11	9.1	47.1	110	19	5.8	Yes	HQ>1
Selenium, total	15	0	ND (1)	nc	ND (1)	5	nd	No	BM>ND
Silver, total	15	1	10	nc	10	0.08	125	Yes	HQ>1
Thallium, total	15	1	1.3	nc	1.3	4	0.3	No	HQ<1
Uranium, total	5	5	32.9	49.3	78	2.6	30	Yes	HQ>1
Vanadium, total	6	1	0.58	0.4	0.58	19	<0.1	No	HQ<1
Zinc, total[a]	16	16	7.7	47.8	100	41	2.4	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-12. Identification of COPC as Total Metals in Surface Water for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (µg/L)**	**Central Tendency[3] (µg/L)**	**Maximum Detection[4] (µg/L)**	**Benchmark Value (BM)[5] (µg/L)**	**Hazard Quotient[6] (HQ)**	**Retained as COPC?**	**Rationale**
Aluminum, total	13	13	240	2,242	5,680	87	65	Yes	HQ>1
Antimony, total	3	1	5.2	2.6	5.2	30	0.2	No	HQ<1
Arsenic, total	13	2	0.57	1.8	1.5	150	<0.1	No	HQ<1
Barium, total	13	13	27.4	36.5	49.7	3.9	12.7	Yes	HQ>1
Beryllium, total	13	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, total[a]	14	1	1.5	nc	1.5	0.12	12.5	Yes	HQ>1
Chromium, total[b]	13	10	0.5	1.6	3.2	10	0.3	No	HQ<1
Cobalt, total	3	0	ND (0.5)	nc	ND (0.5)	3	nd	No	BM>ND
Copper, total[a]	14	5	1	3.9	24.7	3.2	7.7	Yes	HQ>1
Iron, total	13	13	220	1,587	4,660	1,000	4.7	Yes	HQ>1
Lead, total[a]	13	6	0.8	1.5	9.2	0.7	13.1	Yes	HQ>1
Magnesium, total	3	3	1980	2,487	3020	82,000	<0.01	No	HQ<1
Manganese, total	14	10	3.7	12.2	39.8	80	0.5	No	HQ<1
Mercury, total[c]	13	1	0.3	nc	0.3	0.77	0.4	No	HQ<1
Mercury, total[d]	13	1	0.3	nc	0.3	0.012	25	Yes	HQ>1
Nickel, total[a]	13	2	0.72	4.1	2.1	19	0.1	No	HQ<1
Selenium, total	13	1	2	nc	2	5	0.4	No	HQ<1
Silver, total	13	0	ND (0.7)	nc	ND (0.7)	0.08	nd	Yes	BM<ND
Thallium, total	13	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Uranium, total	13	13	1.5	13.0	70	2.6	27	Yes	HQ>1
Vanadium, total	3	1	4.3	2.7	4.3	19	0.2	No	HQ<1
Zinc, total[a]	14	3	5	9.1	60.3	41	1.5	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-13. Identification of COPC as Total Metals in Surface Water for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	27	24	50	*1,040*	6,740	87	77	Yes	HQ>1
Antimony, total	9	3	5.5	3.2	7.3	30	0.2	No	HQ<1
Arsenic, total	27	6	0.73	2.2	1.8	150	<0.1	No	HQ<1
Barium, total	27	27	17.2	*45*	54	3.9	13.8	Yes	HQ>1
Beryllium, total	27	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, total[a]	29	6	0.22	0.8	2.4	0.12	20	Yes	HQ>1
Chromium, total[b]	27	22	0.5	*2.0*	10.6	10	1.1	Yes	HQ>1
Cobalt, total	9	0	ND (0.5)	nc	ND (0.5)	3	nd	No	BM>ND
Copper, total[a]	29	22	2	*5.0*	40	3.2	12.5	Yes	HQ>1
Iron, total	27	25	40	*620*	4,080	1,000	4.1	Yes	HQ>1
Lead, total[a]	27	12	0.3	1.0	4	0.7	5.7	Yes	HQ>1
Magnesium, total	9	9	5,130	44,757	92,400	82,000	1.1	Yes	HQ>1
Manganese, total	29	29	9	*169*	1,070	80	13.4	Yes	HQ>1
Mercury, total[c]	27	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, total[d]	27	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, total[a]	27	12	4.9	8.7	20	19	1.1	Yes	HQ>1
Selenium, total	27	1	4.6	nc	4.6	5	0.9	No	HQ<1
Silver, total	27	2	7	nc	10	0.08	125	Yes	HQ>1
Thallium, total	27	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Uranium, total	27	27	7	*20*	100	2.6	38	Yes	HQ>1
Vanadium, total	9	2	4.8	1.8	4.9	19	0.3	No	HQ<1
Zinc, total[a]	29	19	3	*17*	70	41	1.7	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-14. Identification of COPC as Total Metals in Surface Water for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, total	9	8	150	1,783	3,980	87	46	Yes	HQ>1
Antimony, total	9	2	5.5	2.8	8.6	30	0.3	No	HQ<1
Arsenic, total	9	5	0.77	2.1	1.9	150	<0.1	No	HQ<1
Barium, total	9	9	32.4	41.0	61.6	3.9	15.8	Yes	HQ>1
Beryllium, total	9	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, total[a]	9	4	1.5	0.9	1.8	0.12	15.0	Yes	HQ>1
Chromium, total[b]	9	7	2.2	4.7	13	10	1.3	Yes	HQ>1
Cobalt, total	9	2	0.51	0.7	2	3	0.7	No	HQ<1
Copper, total[a]	9	7	2.3	5.1	14.1	3.2	4.4	Yes	HQ>1
Iron, total	9	9	37.5	1,199	2,870	1,000	2.9	Yes	HQ>1
Lead, total[a]	9	2	1.9	1.1	2.5	0.7	3.6	Yes	HQ>1
Magnesium, total	9	9	4790	29,208	79,100	82,000	1.0	Yes	HQ=1
Manganese, total	9	9	26.2	62.6	90.3	80	1.1	Yes	HQ>1
Mercury, totalc	9	1	0.21	0.1	0.21	0.77	0.3	No	HQ<1
Mercury, total[d]	9	1	0.21	0.1	0.21	0.012	17.5	Yes	HQ>1
Nickel, total[a]	9	4	2.2	3.7	8.3	19	0.4	No	HQ<1
Selenium, total	9	0	ND (1)	nc	ND (1)	5	nd	No	BM>ND
Silver, total	9	0	ND (0.7)	nc	ND (0.7)	0.08	nd	Yes	BM<ND
Thallium, total	9	0	ND (1.1)	nc	ND (1.1)	4	nd	No	BM>ND
Uranium, total	8	8	7	15.3	27	2.6	10.4	Yes	HQ>1
Vanadium, total	9	3	4.5	2.1	4.8	19	0.3	No	HQ<1
Zinc, total[a]	9	9	1.7	22.9	52.2	41	1.3	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-15. Identification of COPC as Total Metals
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (µg/L)	Benchmark Value (BM)[3] (µg/L)	Hazard Quotient[4] (HQ)	Retained as COPC?	Rationale
Aluminum, total	1	0	ND (170)	87	nd	Yes	BM<ND
Antimony, total	1	0	ND (5)	30	nd	No	BM>ND
Arsenic, total	1	0	ND (6)	150	nd	No	BM>ND
Barium, total	1	1	20.6	3.9	5.3	Yes	HQ>1
Beryllium, total	1	0	ND (1.3)	0.53	nd	Yes	BM<ND
Cadmium, total[a]	1	0	ND (1)	0.12	nd	Yes	BM<ND
Calcium, total	1	1	11500	116,000	0.1	No	HQ<1
Chromium, total[b]	1	0	ND (1)	10	nd	No	BM>ND
Cobalt, total	1	0	ND (1)	3	nd	No	BM>ND
Copper, total[a]	1	1	8.6	3.2	2.7	Yes	HQ>1
Iron, total	1	1	244	1,000	0.2	No	HQ<1
Lead, total[a]	1	0	ND (2)	0.7	nd	No	BM>ND
Magnesium, total	1	1	3,980	82,000	0.1	No	HQ<1
Manganese, total	1	1	18.3	80	0.2	No	HQ<1
Mercury, total[c]	1	0	ND (0.2)	0.77	nd	No	BM>ND
Mercury, total[d]	1	0	ND (0.2)	0.012	nd	Yes	BM<ND
Nickel, total[a]	1	0	ND (1)	19	nd	No	BM>ND
Potassium, total	1	1	701	53,000	0.01	No	HQ<1
Selenium, total	1	0	ND (4)	5	nd	No	BM>ND
Silver, total	1	0	ND (2)	0.08	nd	Yes	BM<ND
Sodium, total	1	1	2,380	680,000	0.004	No	HQ<1
Thallium, total	1	0	ND (6)	4	nd	Yes	BM<ND
Uranium, total	1	0	ND (1)	2.6	nd	No	BM>ND
Vanadium, total	1	0	ND (1)	19	nd	No	BM>ND
Zinc, total[a]	1	1	58	41	1.4	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-16. Identification of COPC as Total Metals in Surface Water for Background
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection**[2] **(µg/L)**	**Central Tendency**[3] **(µg/L)**	**Maximum Detection**[4] **(µg/L)**	**Benchmark Value**[5] **(µg/L)**	**Hazard Quotient**[6]	**Retained as COPC?**	**Rationale**
Aluminum, total	58	55	9.4	*1,430*	8,540	87	98.2	Yes	HQ>1
Antimony, total	57	13	0.16	1.3	5.5	30	0.2	No	HQ<1
Arsenic, total	58	57	0.69	*3.7*	46.1	150	0.3	No	HQ<1
Barium, total	58	58	2.7	*29.6*	274	3.9	70.3	Yes	HQ>1
Beryllium, total	58	14	0.1	0.2	0.5	0.53	0.9	No	HQ<1
Cadmium, total[a]	58	3	0.25	nc	6.2	0.12	51.7	Yes	HQ>1
Calcium, total	57	57	2,080	*7,630*	62,800	116,000	0.5	No	HQ<1
Chromium, total[b]	58	28	0.5	1.2	7.2	10	0.7	No	HQ<1
Cobalt, total	57	15	0.64	1.6	20.2	3	6.7	Yes	HQ>1
Copper, total[a]	58	41	0.65	*1.6*	17.1	3.2	5.3	Yes	HQ>1
Iron, total	58	56	90	*1,580*	20,200	1,000	20.2	Yes	HQ>1
Lead, total[a]	58	34	0.11	1.4	6.3	0.7	9.0	Yes	HQ>1
Magnesium, total	57	57	981	*2,000*	18,500	82,000	0.2	No	HQ<1
Manganese, total	58	57	1.2	*30.5*	2,230	80	27.9	Yes	HQ>1
Mercury, total[c]	39	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, total[d]	39	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Molybdenum, total	19	1	11.5	nc	11.5	240	0.05	No	HQ<1
Nickel, total[a]	58	24	0.72	2.2	12.9	19	0.7	No	HQ<1
Potassium, total	57	57	854	*1,540*	9,330	53,000	0.2	No	HQ<1
Selenium, total	58	8	0.21	0.4	0.63	5	0.1	No	HQ<1
Silver, total	58	0	ND (0.7)	nc	ND (0.7)	0.08	nd	Yes	BM<ND
Sodium, total	57	57	2,640	*5,210*	9,620	680,000	0.01	No	HQ<1
Thallium, total	58	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Uranium, total	58	57	0.0002	*0.002*	0.017	2.6	0.01	No	HQ<1
Vanadium, total	57	33	0.69	3.3	21.3	19	1.1	Yes	HQ>1
Zinc, total[a]	58	37	0.53	*2.9*	34.3	41	0.8	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ >1 or BM < ND
COPC = Contaminant of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-17. Identification of COPC as Dissolved Metals in Surface Water for Pit 3
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	1	0	ND (50)	nc	ND (50)	30	nd	Yes	BM < ND
Arsenic, dissolved	9	4	6	8	20	150	0.1	No	HQ < 1
Barium, dissolved	9	9	8	11	14.4	3.9	3.7	Yes	HQ > 1
Beryllium, dissolved	9	9	28	35	50	0.53	94	Yes	HQ > 1
Cadmium, dissolved[a]	9	9	28	49	97.8	0.12	815	Yes	HQ > 1
Chromium, dissolved[b]	9	5	0.9	8	5	10	0.5	No	HQ < 1
Cobalt, dissolved	1	1	930	930	930	3	310	Yes	HQ > 1
Copper, dissolved[a]	9	9	49	224	302	3.2	94	Yes	HQ > 1
Lead, dissolved[a]	9	6	2	4	6.4	0.7	9.1	Yes	HQ > 1
Magnesium, dissolved	9	9	252,000	281,889	304,000	82,000	3.7	Yes	HQ > 1
Manganese, dissolved	9	9	65,800	91,667	123,000	80	1,538	Yes	HQ > 1
Mercury, dissolved[c]	9	0	ND (0.2)	nc	ND (0.2)	0.77	nd	No	BM > ND
Mercury, dissolved[d]	9	0	ND (0.2)	nc	ND (0.2)	0.012	nd	Yes	BM < ND
Nickel, dissolved[a]	9	9	1,300	1,666	2,480	19	131	Yes	HQ > 1
Silver, dissolved	9	0	ND (5)	nc	ND (5)	0.08	nd	Yes	BM < ND
Thallium, dissolved	9	2	0.2	nc	0.4	4	0.1	No	HQ < 1
Vanadium, dissolved	1	0	ND (30)	nc	ND (30)	19	nd	Yes	BM < ND
Zinc, dissolved[a]	9	9	2,700	3,751	5,590	41	136	Yes	HQ > 1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-18. Identification of COPC as Dissolved Metals in Surface Water for Pit 4
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Arsenic, dissolved	8	0	ND (1)	nc	ND (1)	150	nd	No	BM>ND
Barium, dissolved	8	8	4.4	5	6.6	3.9	1.7	Yes	HQ>1
Beryllium, dissolved	8	0	ND (2)	nc	ND (2)	0.53	nd	No	BM>ND
Cadmium, dissolved[a]	8	1	0.3	0	0.3	0.12	2.5	Yes	HQ>1
Chromium, dissolved[b]	8	0	ND (0.1)	nc	ND (0.1)	10	nd	No	BM>ND
Copper, dissolved[a]	8	7	2	4	8	3.2	2.5	Yes	HQ>1
Lead, dissolved[a]	8	0	ND (0.2)	nc	ND (0.2)	0.7	nd	No	BM>ND
Magnesium, dissolved	8	8	8,700	20,088	25,600	82,000	0.3	No	HQ<1
Manganese, dissolved	8	8	261	587	793	80	9.9	Yes	HQ>1
Mercury, dissolved[c]	8	0	ND (0.2)	nc	ND (0.2)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	8	0	ND (0.2)	nc	ND (0.2)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	8	5	10	14	30	19	1.6	Yes	HQ>1
Silver, dissolved	8	0	ND (5)	nc	ND (5)	0.08	nd	Yes	BM<ND
Thallium, dissolved	8	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Zinc, dissolved[a]	8	7	6	17	28	41	0.7	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-19. Identification of COPC as Dissolved Metals in Surface Water for Blood Pool
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, dissolved	5	5	1,720	49,402	92,000	87	1,057	Yes	HQ>1
Arsenic, dissolved	5	0	ND (2)	nc	ND (2)	150	nd	No	BM>ND
Barium, dissolved	5	5	3.2	8.6	21	3.9	5.4	Yes	HQ>1
Beryllium, dissolved	5	4	2	10.2	18	0.53	34	Yes	HQ>1
Cadmium, dissolved[a]	5	5	1.4	5.1	9	0.12	75	Yes	HQ>1
Chromium, dissolved[b]	5	4	1.1	12.8	26	10	2.6	Yes	HQ>1
Copper, dissolved[a]	5	5	58	580	1,030	3.2	322	Yes	HQ>1
Lead, dissolved[a]	5	0	ND (0.4)	nc	ND (0.4)	0.7	nd	No	BM>ND
Magnesium, dissolved	5	5	36,600	86,960	126,000	82,000	1.5	Yes	HQ>1
Manganese, dissolved	5	5	3,020	19,924	35,800	80	448	Yes	HQ>1
Mercury, dissolved[c]	5	1	ND (0.2)	0.2	0.5	0.77	0.6	No	HQ<1
Mercury, dissolved[d]	5	1	ND (0.2)	0.2	0.5	0.012	42	Yes	HQ>1
Nickel, dissolved[a]	5	5	90	596	1,090	19	57	Yes	HQ>1
Silver, dissolved	5	0	ND (5)	nc	ND (5)	0.08	nd	Yes	BM<ND
Sodium, dissolved	5	5	7,900	13,000	20,300	680,000	<.01	No	HQ<1
Thallium, dissolved	5	0	ND (0.2)	nc	ND (0.2)	4	nd	No	BM>ND
Zinc, dissolved[a]	5	5	130	572	970	41	24	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-20. Identification of COPC as Dissolved Metals in Surface Water for Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	1	0	ND (5)	nc	ND (5)	30	nd	No	BM>ND
Arsenic, dissolved	16	9	2	5.6	8	150	0.1	No	BM>ND
Barium, dissolved	16	15	7	15.3	11	3.9	2.8	Yes	HQ>1
Beryllium, dissolved	16	16	16	35.6	60	0.53	113	Yes	HQ>1
Cadmium, dissolved[a]	16	16	27.6	45.5	69	0.12	575	Yes	HQ>1
Chromium, dissolved[b]	16	10	0.5	6.1	7	10	0.7	No	HQ<1
Cobalt, dissolved	1	1	1,240	1,240	1,240	3	413	Yes	HQ>1
Copper, dissolved[a]	16	13	95	248	420	3.2	131	Yes	HQ>1
Lead, dissolved[a]	16	9	0.8	20.0	2	0.7	2.9	Yes	HQ>1
Magnesium, dissolved	16	16	289,000	362,688	469,000	82,000	5.7	Yes	HQ>1
Manganese, dissolved	16	16	46,900	89,475	135,000	80	1,688	Yes	HQ>1
Mercury, dissolved[c]	16	1	ND (0.2)	nc	0.2	0.77	0.3	No	HQ<1
Mercury, dissolved[d]	16	1	ND (0.2)	nc	0.2	0.012	16.7	Yes	HQ>1
Nickel, dissolved[a]	16	16	870	1,750	2,690	19	142	Yes	HQ>1
Silver, dissolved	16	1	30	nc	30	0.08	375	Yes	HQ>1
Thallium, dissolved	16	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Vanadium, dissolved	1	0	ND (30)	nc	ND (30)	19	nd	No	BM>ND
Zinc, dissolved[a]	16	16	920	3,694	5,930	41	145	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-21. Identification of COPC as Dissolved Metals in Surface Water for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	2	1	4.5	2.8	4.5	30	0.2	No	HQ<1
Arsenic, dissolved	2	0	ND (0.2)	nc	ND (0.2)	150	nd	No	BM>ND
Barium, dissolved	2	2	55.5	59.9	64.3	3.9	16.5	Yes	HQ>1
Beryllium, dissolved	2	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, dissolved[a]	2	0	ND (0.2)	nc	ND (0.2)	0.12	nd	Yes	BM<ND
Chromium, dissolved[b]	2	2	0.89	1.4	1.9	10	0.2	No	HQ<1
Cobalt, dissolved	2	0	ND (0.5)	nc	ND (0.5)	3	nd	No	BM>ND
Copper, dissolved[a]	2	0	ND (0.5)	nc	ND (0.5)	3.2	nd	No	BM>ND
Lead, dissolved[a]	2	0	ND (1)	nc	ND (1)	0.7	nd	No	BM>ND
Magnesium, dissolved	2	2	90,700	95,350	100,000	82,000	1.2	Yes	HQ>1
Manganese, dissolved	2	2	153	203	253	80	3.2	Yes	HQ>1
Mercury, dissolved[c]	2	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	2	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	2	1	3.4	2.4	3.4	19	0.2	No	HQ<1
Silver, dissolved	2	0	ND (0.7)	nc	ND (0.7)	0.08	nd	No	BM<ND
Thallium, dissolved	2	0	ND (1.1)	nc	ND (1.1)	4	nd	Yes	BM>ND
Vanadium, dissolved	2	0	ND (0.5)	nc	ND (0.5)	19	nd	Yes	BM>ND
Zinc, dissolved[a]	2	0	ND (0.4)	nc	ND (0.4)	41	nd	Yes	BM>ND

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-22. Identification of COPC as Dissolved Metals in Surface Water for Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	3	0	ND (0.5)	nc	ND (0.5)	30	nd	No	BM>ND
Arsenic, dissolved	16	3	0.2	4.0	3	150	<.01	No	HQ<1
Barium, dissolved	16	16	14.7	21.7	57	3.9	14.6	Yes	HQ>1
Beryllium, dissolved	16	8	1	2.6	5	0.53	9.4	Yes	HQ>1
Cadmium, dissolved[a]	16	13	0.99	3.2	5.2	0.12	43	Yes	HQ>1
Chromium, dissolved[b]	16	4	0.3	1.0	2	10	0.2	No	HQ<1
Cobalt, dissolved	3	1	4	4.9	4	3	1.3	Yes	HQ>1
Copper, dissolved[a]	16	13	2.4	18.9	80	3.2	25	Yes	HQ>1
Lead, dissolved[a]	16	1	0.5	nc	0.5	0.7	0.7	No	HQ<1
Magnesium, dissolved	16	16	77,000	187,950	270,000	82,000	3.3	Yes	HQ>1
Manganese, dissolved	16	16	41.9	8,695	17,100	80	214	Yes	HQ>1
Mercury, dissolved[c]	16	1	ND (0.2)	nc	0.2	0.77	0.3	No	HQ<1
Mercury, dissolved[d]	16	1	ND (0.2)	nc	0.2	0.012	16.7	Yes	HQ>1
Nickel, dissolved[a]	16	15	89.6	236	380	19	20	Yes	HQ>1
Silver, dissolved	16	3	1.5	4.3	10	0.08	125	Yes	HQ>1
Thallium, dissolved	16	1	0.3	nc	0.3	4	0.1	No	HQ<1
Vanadium, dissolved	3	1	2.6	2.7	2.6	19	0.1	No	HQ<1
Zinc, dissolved[a]	16	16	30	289	460	41	11.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-23. Identification of COPC as Dissolved Metals in Surface Water for Far Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Maximum Detection[3] (µg/L)	Benchmark Value (BM)[4] (µg/L)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	1	0	ND (2.7)	ND (2.7)	30	nd	No	BM>ND
Arsenic, dissolved	1	1	1.4	1.4	150	0.01	No	HQ<1
Barium, dissolved	1	1	43.3	43.3	3.9	11.1	Yes	HQ>1
Beryllium, dissolved	1	0	ND (0.1)	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, dissolved[a]	1	0	ND (0.5)	ND (0.5)	0.12	nd	Yes	BM<ND
Chromium, dissolved[c]	1	0	ND (1.1)	ND (1.1)	10	nd	No	BM>ND
Cobalt, dissolved	1	0	ND (1.2)	ND (1.2)	3	nd	No	BM>ND
Copper, dissolved[a]	1	1	1.4	1.4	3.2	0.4	No	HQ<1
Lead, dissolved[a]	1	0	ND (0.9)	ND (0.9)	0.7	nd	No	BM>ND
Magnesium, dissolved	1	1	3,880	3,880	82,000	0.05	No	HQ<1
Manganese, dissolved	1	1	3.7	3.7	80	0.05	No	HQ<1
Mercury, dissolved[c]	1	0	ND (0.1)	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	1	0	ND (0.1)	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	1	0	ND (0.92)	ND (0.92)	19	nd	No	BM>ND
Silver, dissolved	1	0	ND (0.8)	ND (0.8)	0.08	nd	Yes	BM<ND
Thallium, dissolved	1	0	ND (1.2)	ND (1.2)	4	nd	No	BM>ND
Vanadium, dissolved	1	1	2.4	2.4	19	0.1	No	HQ<1
Zinc, dissolved[a]	1	1	3.8	3.8	41	0.1	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-24. Identification of COPC as Dissolved Metals in Surface Water for Northeastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Maximum Detection[3] (µg/L)	Benchmark Value (BM)[4] (µg/L)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	1	1	2.9	2.9	30	0.1	No	HQ<1
Arsenic, dissolved	1	1	1.6	1.6	150	0.01	No	HQ<1
Barium, dissolved	1	0	ND (10.8)	ND (10.8)	3.9	nd	No	BM>ND
Beryllium, dissolved	1	0	ND (0.22)	ND (0.22)	0.53	nd	No	BM>ND
Cadmium, dissolved[a]	1	0	ND (0.5)	ND (0.5)	0.12	nd	Yes	BM<ND
Chromium, dissolvedb	1	0	ND (1.1)	ND (1.1)	10	nd	No	BM>ND
Cobalt, dissolved	1	0	ND (5.1)	ND (5.1)	3	nd	Yes	BM<ND
Copper, dissolved[a]	1	1	2.1	2.1	3.2	0.7	No	HQ<1
Lead, dissolved[a]	1	1	1.2	1.2	0.7	1.7	Yes	HQ>1
Magnesium, dissolved	1	1	2,100	2,100	82,000	0.03	No	HQ<1
Manganese, dissolved	1	1	197	197	80	2.5	Yes	HQ>1
Mercury, dissolved[c]	1	0	ND (0.1)	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	1	0	ND (0.1)	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	1	0	ND (3.7)	ND (3.7)	19	nd	No	BM>ND
Silver, dissolved	1	0	ND (0.8)	ND (0.8)	0.08	nd	Yes	BM<ND
Thallium, dissolved	1	0	ND (1.2)	ND (1.2)	4	nd	No	BM>ND
Vanadium, dissolved	1	0	ND (2)	ND (2)	19	nd	No	BM>ND
Zinc, dissolved[a]	1	1	4.6	4.6	41	0.1	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-25. Identification of COPC as Dissolved Metals in Surface Water for Central Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	3	1	0.4	1.0	0.4	30	0.01	No	HQ<1
Arsenic, dissolved	16	5	0.61	2.0	1.3	150	0.01	No	HQ<1
Barium, dissolved	16	16	10.9	12.9	18.6	3.9	4.8	Yes	HQ>1
Beryllium, dissolved	16	6	2.8	2.7	4	0.53	7.5	Yes	HQ>1
Cadmium, dissolved[a]	16	16	28	44.0	54	0.12	450	Yes	HQ>1
Chromium, dissolved[b]	16	2	0.5	1.0	9.4	10	0.9	No	HQ<1
Cobalt, dissolved	3	3	40.7	54.4	70	3	23.3	Yes	HQ>1
Copper, dissolved[a]	16	15	1.3	18.3	47	3.2	14.7	Yes	HQ>1
Lead, dissolved[a]	16	1	0.2	nc	0.2	0.7	0.3	No	HQ<1
Magnesium, dissolved	16	16	150,000	252,938	304,000	82,000	3.7	Yes	HQ>1
Manganese, dissolved	16	16	41,800	70,769	94,000	80	1,175	Yes	HQ>1
Mercury, dissolved[c]	16	1	ND (0.2)	nc	0.2	0.77	0.3	No	HQ<1
Mercury, dissolved[d]	16	1	ND (0.2)	nc	0.2	0.012	16.7	Yes	HQ>1
Nickel, dissolved[a]	16	16	730	1,156	1,410	19	74	Yes	HQ>1
Silver, dissolved	16	5	2.9	6.0	12	0.08	150	Yes	HQ>1
Thallium, dissolved	16	1	0.07	nc	0.07	4	0.02	No	HQ<1
Vanadium, dissolved	3	1	2.1	1.7	2.1	19	0.1	No	HQ<1
Zinc, dissolved[a]	16	14	740	1,042	1,480	41	36	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-26. Identification of COPC as Dissolved Metals in Surface Water for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection**[2] **(µg/L)**	**Central Tendency**[3] **(µg/L)**	**Maximum Detection**[4] **(µg/L)**	**Benchmark Value (BM)**[5] **(µg/L)**	**Hazard Quotient**[6] **(HQ)**	**Retained as COPC?**	**Rationale**
Antimony, dissolved	13	4	2.8	1.9	4.1	30	0.1	No	HQ<1
Arsenic, dissolved	32	21	0.85	*2.5*	3.7	150	0.02	No	HQ<1
Barium, dissolved	32	32	19	*42.8*	103	3.9	26	Yes	HQ>1
Beryllium, dissolved	32	2	0.15	nc	0.2	0.53	0.4	No	HQ<1
Cadmium, dissolved[a]	32	8	0.3	0.9	4.2	0.12	35	Yes	HQ>1
Chromium, dissolved[b]	32	15	0.3	1.6	9	10	0.9	No	HQ<1
Cobalt, dissolved	13	7	0.86	1.2	2.7	3	0.9	No	HQ<1
Copper, dissolved[a]	32	16	3	9.8	50	3.2	15.6	Yes	HQ>1
Lead, dissolved[a]	32	1	3.2	nc	3.2	0.7	4.6	Yes	HQ>1
Magnesium, dissolved	32	32	29,600	*73,550*	256,000	82,000	3.1	Yes	HQ>1
Manganese, dissolved	32	31	1.3	*50.2*	16300	80	204	Yes	HQ>1
Mercury, dissolved[c]	32	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	32	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	32	12	0.74	28.6	340	19	17.9	Yes	HQ>1
Silver, dissolved	32	3	1.8	nc	30	0.08	375	Yes	HQ>1
Thallium, dissolved	32	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Vanadium, dissolved	13	2	0.77	0.5	1.4	19	0.1	No	HQ<1
Zinc, dissolved[a]	32	17	5	32.2	370	41	9.0	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-27. Identification of COPC as Dissolved Metals in Surface Water for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (µg/L)**	**Central Tendency[3] (µg/L)**	**Maximum Detection[4] (µg/L)**	**Benchmark Value (BM)[5] (µg/L)**	**Hazard Quotient[6] (HQ)**	**Retained as COPC?**	**Rationale**
Antimony, dissolved	4	3	2.4	3.4	7	30	0.2	No	HQ<1
Arsenic, dissolved	13	5	1	1.9	1.8	150	0.01	No	HQ<1
Barium, dissolved	13	13	16.6	43.1	77	3.9	19.7	Yes	HQ>1
Beryllium, dissolved	13	1	0.25	nc	0.25	0.53	0.5	No	HQ<1
Cadmium, dissolved[a]	13	8	0.24	1.3	2.8	0.12	23.3	Yes	HQ>1
Chromium, dissolved[b]	13	4	1.1	1.3	7	10	0.7	No	HQ<1
Cobalt, dissolved	4	1	1.7	0.7	1.7	3	0.6	No	HQ<1
Copper, dissolved[a]	13	10	1.2	11.0	50	3.2	15.6	Yes	HQ>1
Lead, dissolved[a]	13	0	ND (0.2)	nc	ND (0.2)	0.7	nd	No	BM>ND
Magnesium, dissolved	13	13	66,100	94,885	131,000	82,000	1.6	Yes	HQ>1
Manganese, dissolved	13	13	289	2,036	4,880	80	61	Yes	HQ>1
Mercury, dissolved[c]	13	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	13	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<1
Nickel, dissolved[a]	13	9	8.8	58.1	190	19	10.0	Yes	HQ>1
Silver, dissolved	13	2	10	5.3	30	0.08	375	Yes	HQ>1
Thallium, dissolved	13	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Vanadium, dissolved	4	1	0.9	0.5	0.9	19	0.05	No	HQ<1
Zinc, dissolved[a]	13	11	20	52.5	115	41	2.8	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ ≥1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-28. Identification of COPC as Dissolved Metals in Surface Water for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (µg/L)**	**Central Tendency[3] (µg/L)**	**Maximum Detection[4] (µg/L)**	**Benchmark Value (BM)[5] (µg/L)**	**Hazard Quotient[6] (HQ)**	**Retained as COPC?**	**Rationale**
Antimony, dissolved	2	1	6.2	3.7	6.2	30	0.2	No	HQ<1
Arsenic, dissolved	12	2	0.51	1.2	1.4	150	0.01	No	HQ<1
Barium, dissolved	12	12	26	31.7	42.7	3.9	10.9	Yes	HQ>1
Beryllium, dissolved	12	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, dissolveda	12	0	ND (0.2)	nc	ND (0.2)	0.12	nd	Yes	BM<ND
Chromium, dissolved[b]	12	4	0.5	0.7	2.9	10	0.3	No	HQ<1
Cobalt, dissolved	2	0	ND (0.5)	nc	ND (0.5)	3	nd	Yes	BM>ND
Copper, dissolved[a]	12	1	2	nc	2	3.2	0.6	No	HQ<1
Lead, dissolved[a]	12	2	0.6	0.4	1.3	0.7	1.9	Yes	HQ>1
Magnesium, dissolved	12	12	1,990	3,360	6,100	82,000	0.1	No	HQ<1
Manganese, dissolved	12	9	1.5	5.7	20.2	80	0.3	No	HQ<1
Mercury, dissolved[c]	12	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	12	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	12	0	ND (0.5)	nc	ND (0.5)	19	nd	No	BM>ND
Silver, dissolved	12	0	ND (0.7)	nc	ND (0.7)	0.08	nd	Yes	BM<ND
Thallium, dissolved	12	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Vanadium, dissolved	2	1	5.1	2.7	5.1	19	0.3	No	HQ<1
Zinc, dissolved[a]	12	4	5	5.7	30	41	0.7	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-29. Identification of COPC as Dissolved Metals in Surface Water for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Antimony, dissolved	4	0	ND (2.2)	na	ND (2.2)	30	nd	No	BM>ND
Arsenic, dissolved	22	6	0.78	1.7	1.4	150	0.01	No	HQ<1
Barium, dissolved	22	22	16	*40.1*	60.2	3.9	15.4	Yes	HQ>1
Beryllium, dissolved	22	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, dissolved[a]	22	0	ND (0.2)	nc	ND (0.2)	0.12	nd	Yes	BM<1
Chromium, dissolved[b]	22	11	0.4	1.2	7.4	10	0.7	No	HQ<1
Cobalt, dissolved	4	0	ND (0.5)	nc	ND (0.5)	3	nd	No	BM>1
Copper, dissolved[a]	22	12	2	9.8	37	3.2	11.6	Yes	HQ>1
Lead, dissolved[a]	22	2	1	nc	1.1	0.7	1.6	Yes	HQ>1
Magnesium, dissolved	22	22	5,830	*39,850*	105,000	82,000	1.3	Yes	HQ>1
Manganese, dissolved	22	21	1.8	*68.8*	1070	80	13.4	Yes	HQ>1
Mercury, dissolved[c]	22	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	22	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	22	9	3.3	8.5	30	19	1.6	Yes	HQ>1
Silver, dissolved	22	1	20	nc	20	0.08	250	Yes	HQ>1
Thallium, dissolved	22	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Vanadium, dissolved	4	2	2.9	1.9	4.2	19	0.2	No	HQ<1
Zinc, dissolved[a]	22	17	7.2	*19.5*	40	41	1.0	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-30. Identification of COPC as Dissolved Metals in Surface Water for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (µg/L)**	**Central Tendency[3] (µg/L)**	**Maximum Detection[4] (µg/L)**	**Benchmark Value (BM)[5] (µg/L)**	**Hazard Quotient[6] (HQ)**	**Retained as COPC?**	**Rationale**
Antimony, dissolved	5	1	2.8	1.5	2.8	30	0.1	No	HQ<1
Arsenic, dissolved	5	5	0.72	1.2	1.6	150	0.01	No	HQ<1
Barium, dissolved	5	5	32.7	43.1	58.4	3.9	15	Yes	HQ>1
Beryllium, dissolved	5	0	ND (0.1)	nc	ND (0.1)	0.53	nd	No	BM>ND
Cadmium, dissolved[a]	5	0	ND (0.2)	nc	ND (0.2)	0.12	nd	Yes	BM<ND
Chromium, dissolved[b]	5	3	1.7	1.6	3.7	10	0.4	No	HQ<1
Cobalt, dissolved	5	0	ND (0.5)	nc	ND (0.5)	3	nd	No	BM>ND
Copper, dissolved[a]	5	0	U (0.5)	nc	ND (0.5)	3.2	nd	No	BM>ND
Lead, dissolved[a]	5	2	1.1	0.8	1.6	0.7	2.3	Yes	HQ>1
Magnesium, dissolved	5	5	4,580	34,770	79,800	82,000	1.0	Yes	HQ=1
Manganese, dissolved	5	5	11.1	29.1	36.7	80	0.5	No	HQ<1
Mercury, dissolved[c]	5	0	ND (0.1)	nc	ND (0.1)	0.77	nd	No	BM>ND
Mercury, dissolved[d]	5	0	ND (0.1)	nc	ND (0.1)	0.012	nd	Yes	BM<ND
Nickel, dissolved[a]	5	2	2.5	2.6	4.4	19	0.2	No	HQ<1
Silver, dissolved	5	0	ND (0.7)	nc	ND (0.7)	0.08	nd	Yes	BM<ND
Thallium, dissolved	5	0	ND (1.1)	nc	ND (1.1)	4	nd	No	BM>ND
Vanadium, dissolved	5	3	3.5	2.5	4.7	19	0.2	No	HQ<1
Zinc, dissolved[a]	5	3	5.4	4.0	6.5	41	0.2	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Table D-31. Identification of COPC as Dissolved Metals in Surface Water for Background
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (µg/L)	Central Tendency[3] (µg/L)	Maximum Detection[4] (µg/L)	Benchmark Value (BM)[5] (µg/L)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum, dissolved	58	56	9	*158*	6,620	87	76.1	Yes	HQ>1
Antimony, dissolved	57	8	0.1	1.1	5.8	30	0.2	No	HQ<1
Arsenic, dissolved	58	57	0.36	*2.8*	21.3	150	0.1	No	HQ<1
Barium, dissolved	58	58	1.9	*19.5*	252	3.9	64.6	Yes	HQ>1
Beryllium, dissolved	58	2	0.1	na	0.26	0.53	0.5	No	HQ<1
Cadmium, dissolved[a]	58	3	0.78	na	9.2	0.12	76.7	Yes	HQ>1
Calcium, dissolved	58	58	1,550	*8,015*	63,300	116,000	0.5	No	HQ<1
Chromium, dissolved[b]	58	8	0.63	0.6	3.2	10	0.3	No	HQ<1
Cobalt, dissolved	57	10	0.55	0.9	7.3	3	2.4	Yes	HQ>1
Copper, dissolved[a]	58	15	0.64	0.9	3	3.2	0.9	No	HQ<1
Iron, dissolved	58	48	30	*332*	5,030	1,000	5.0	Yes	HQ>1
Lead, dissolved[a]	58	23	0.1	0.6	4.5	0.7	6.4	Yes	HQ>1
Magnesium, dissolved	58	58	724	*1,970*	17,900	82,000	0.2	No	HQ<1
Manganese, dissolved	58	55	1.1	*9.0*	2,040	80	25.5	Yes	HQ>1
Mercury, dissolved[c]	39	1	0.1	nc	0.1	0.77	0.1	No	HQ<1
Mercury, dissolved[d]	39	1	0.1	nc	0.1	0.012	8.3	Yes	HQ>1
Molybdenum, dissolved	19	5	2.9	2.0	11.4	240	0.0	No	HQ<1
Nickel, dissolved[a]	58	2	1.2	nc	1.4	19	0.1	No	HQ<1
Potassium, dissolved	58	58	866	*1,480*	8,990	53,000	0.2	No	HQ<1
Selenium, dissolved	58	3	0.2	nc	0.33	5	0.1	No	HQ<1
Silver, dissolved	58	0	ND (0.7)	nc	ND (0.7)	0.08	nd	Yes	BM<ND
Sodium, dissolved	58	57	2,640	*4,945*	10,200	680,000	0.02	No	HQ<1
Thallium, dissolved	58	0	ND (0.1)	nc	ND (0.1)	4	nd	No	BM>ND
Vanadium, dissolved	57	20	0.91	1.2	7.6	19	0.4	No	HQ<1
Zinc, dissolved[a]	58	27	0.32	2.2	13.6	41	0.3	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000-2001).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value / BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined
shaded rows = HQ $\geq$1 or BM < ND
COPC = Contaminants of Potential Concern
µg/L = micrograms per liter

a = hardness dependent metals. BM based on dissolved concentration and 30 ppm hardness
b = Chromium BM based on Cr VI, not Cr III.
c = Hg BM derived from water quality criteria, U.S. EPA, 2002
d = Hg BM derived from Spokane Tribe of Indians criteria, Feb 2001.

Appendix E - Instream Sediment Screening Tables
Midnite Mine Site
Wellpinit, Washington

Table E-1. Identification of COPC in Sediment Composite Samples for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	17,100	9,400	1.8	Yes	HQ>1
Antimony	1	0	ND (0.32)	0.49	nd	No	BM>ND
Arsenic	1	1	7.2	9.79	0.7	No	HQ<1
Barium	1	1	165	500	0.3	No	HQ<1
Beryllium	1	1	0.98	0.7	1.4	Yes	HQ>1
Cadmium	1	1	0.14	0.99	0.1	No	HQ<1
Chromium	1	1	18.1	43.4	0.4	No	HQ<1
Cobalt	1	1	10.2	20	0.5	No	HQ<1
Copper	1	1	18.3	31.6	0.6	No	HQ<1
Iron	1	1	18,000	10,000	1.8	Yes	HQ>1
Lead	1	1	15.5	35.8	0.4	No	HQ<1
Magnesium	1	1	3,980	6,100	0.7	No	HQ<1
Manganese	1	1	485	736	0.7	No	HQ<1
Mercury	1	0	ND (0.16)	0.18	nd	No	BM>ND
Nickel	1	1	14.6	22.7	0.6	No	HQ<1
Selenium	1	1	0.92	0.1	9.2	Yes	HQ>1
Silver	1	0	ND (0.16)	0.5	nd	No	BM>ND
Thallium	1	1	0.35	3.8	0.1	No	HQ<1
Uranium	1	1	31.9	17	1.9	Yes	HQ>1
Vanadium	1	1	26.1	nb	nb	Yes	nb
Zinc	1	1	73.3	121	0.6	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-2. Identification of COPC in Sediment Composite Samples for Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	3	3	5,930	8,290	12,500	9,400	1.3	Yes	HQ>1
Antimony	3	0	ND (0.22)	nc	ND (0.22)	0.49	nd	No	BM>ND
Arsenic	3	3	4.1	5.5	8.1	9.79	0.8	No	HQ<1
Barium	3	3	38.5	55.5	88.9	500	0.2	No	HQ<1
Beryllium	3	3	0.87	1.2	1.8	0.7	2.6	Yes	HQ>1
Cadmium	3	3	0.19	0.5	1.2	0.99	1.2	Yes	HQ>1
Chromium	3	3	3.6	6.1	10.8	43.4	0.2	No	HQ<1
Cobalt	3	3	6.3	15.6	33.5	20	1.7	Yes	HQ>1
Copper	3	3	6.7	10	16.5	31.6	0.5	No	HQ<1
Iron	3	3	8,910	11,937	16,700	10,000	1.7	Yes	HQ>1
Lead	3	3	7.2	10.0	15.4	35.8	0.4	No	HQ<1
Magnesium	3	3	2,100	2,367	2,680	6,100	0.4	No	HQ<1
Manganese	3	3	624	4,728	12,900	736	17.5	Yes	HQ>1
Mercury	3	0	ND (0.05)	nc	ND (0.05)	0.18	nd	No	BM>ND
Nickel	3	3	9.6	19.5	39	22.7	1.7	Yes	HQ>1
Selenium	3	3	0.3	0.9	1.9	0.1	19.0	Yes	HQ>1
Silver	3	0	ND (0.07)	nc	ND (0.07)	0.5	nd	No	BM>ND
Thallium	3	3	0.17	0.3	0.37	3.8	0.1	No	HQ<1
Uranium	4	4	62.4	203	330	17	19.4	Yes	HQ>1
Vanadium	3	3	12.4	16.4	22.3	nb	nb	Yes	nb
Zinc	3	3	37.7	50.7	74.5	121	0.6	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-3. Identification of COPC in Sediment Composite Samples for Far Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	8,180	8,210	8,240	9,400	0.9	No	HQ<1
Antimony	2	0	ND (0.22)	nc	ND (0.22)	0.49	nd	No	BM>ND
Arsenic	2	2	7.1	7.2	7.2	9.79	0.7	No	HQ<1
Barium	2	2	73	78.4	83.7	500	0.2	No	HQ<1
Beryllium	2	2	0.78	0.8	0.79	0.7	1.1	Yes	HQ>1
Cadmium	2	2	0.23	0.2	0.25	0.99	0.3	No	HQ<1
Chromium	2	2	6.3	6.4	6.5	43.4	0.1	No	HQ<1
Cobalt	2	2	4	4.5	5	20	0.3	No	HQ<1
Copper	2	2	10.7	11.6	12.4	31.6	0.4	No	HQ<1
Iron	2	2	10,400	10,500	10,600	10,000	1.1	Yes	HQ>1
Lead	2	2	11.1	11.5	11.9	35.8	0.3	No	HQ<1
Magnesium	2	2	2,450	2,490	2,530	6,100	0.4	No	HQ<1
Manganese	2	2	361	415	469	736	0.6	No	HQ<1
Mercury	2	0	ND (0.05)	nc	ND (0.05)	0.18	nd	No	BM>ND
Nickel	2	2	6.2	6.5	6.7	22.7	0.3	No	HQ<1
Selenium	2	2	0.39	0.5	0.58	0.1	5.8	Yes	HQ>1
Silver	2	0	ND (0.07)	nc	ND (0.07)	0.5	nd	No	BM>ND
Thallium	2	2	0.17	0.2	0.22	3.8	0.1	No	HQ<1
Uranium	1	1	57.6	57.6	57.6	17	3.4	Yes	HQ>1
Vanadium	2	2	15.1	15.5	15.9	nb	nb	Yes	nb
Zinc	2	2	45.5	49.4	53.2	121	0.4	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-4. Identification of COPC in Sediment Composite Samples for Northern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	15,100	9,400	1.6	Yes	HQ>1
Antimony	1	0	ND (0.32)	0.49	nd	No	BM>ND
Arsenic	1	1	28.2	9.79	2.9	Yes	HQ>1
Barium	1	1	135	500	0.3	No	HQ<1
Beryllium	1	1	1.2	0.7	1.7	Yes	HQ>1
Cadmium	1	1	0.34	0.99	0.3	No	HQ<1
Chromium	1	1	20.8	43.4	0.5	No	HQ<1
Cobalt	1	1	14.9	20	0.7	No	HQ<1
Copper	1	1	30.1	31.6	1.0	No	HQ<1
Iron	1	1	28,100	10,000	2.8	Yes	HQ>1
Lead	1	1	9.3	35.8	0.3	No	HQ<1
Magnesium	1	1	2,980	6,100	0.5	No	HQ<1
Manganese	1	1	487	736	0.7	No	HQ<1
Mercury	1	0	ND (0.32)	0.18	nd	Yes	BM<ND
Nickel	1	1	15.1	22.7	0.7	No	HQ<1
Selenium	1	1	0.86	0.1	8.6	Yes	HQ>1
Silver	1	0	ND (0.07)	0.5	nd	No	BM>ND
Thallium	1	1	0.41	3.8	0.1	No	HQ<1
Uranium	1	1	19.8	17	1.2	Yes	HQ>1
Vanadium	1	1	34.7	nb	nb	Yes	nb
Zinc	1	1	40.5	121	0.3	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-5. Identification of COPC in Sediment Composite Samples for Northeastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	17,600	19,100	20,600	9,400	2.2	Yes	HQ>1
Antimony	2	0	ND (0.22)	nc	ND (0.22)	0.49	nd	No	BM>ND
Arsenic	2	2	14.6	22.1	29.5	9.79	3.0	Yes	HQ>1
Barium	2	2	84.5	112	140	500	0.3	No	HQ<1
Beryllium	2	2	1.3	1.9	2.4	0.7	3.4	Yes	HQ>1
Cadmium	2	1	ND (0.02)	0.2	0.35	0.99	0.4	No	HQ<1
Chromium	2	2	22.2	27.5	32.7	43.4	0.8	No	HQ<1
Cobalt	2	2	15.2	16.9	18.6	20	0.9	No	HQ<1
Copper	2	2	19.2	23.8	28.3	31.6	0.9	No	HQ<1
Iron	2	2	23,200	28,650	34,100	10,000	3.4	Yes	HQ>1
Lead	2	2	15.3	19.6	23.8	35.8	0.7	No	HQ<1
Magnesium	2	2	4,470	4,480	4,490	6,100	0.7	No	HQ<1
Manganese	2	2	548	657	766	736	1.0	Yes	HQ>1
Mercury	2	0	ND (0.06)	nc	ND (0.06)	0.18	nd	No	BM>ND
Nickel	2	2	19.3	27.9	36.4	22.7	1.6	Yes	HQ>1
Selenium	2	2	0.88	1.0	1.1	0.1	11.0	Yes	HQ>1
Silver	2	0	ND (0.07)	nc	ND (0.07)	0.5	nd	No	BM>ND
Thallium	2	2	0.43	0.6	0.71	3.8	0.2	No	HQ<1
Uranium	2	2	41.9	116	190	17	11.2	Yes	HQ>1
Vanadium	2	2	36.4	40.6	44.8	nb	nb	Yes	nb
Zinc	2	2	48.5	58.2	67.8	121	0.6	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-6. Identification of COPC in Sediment Composite Samples for Southwestern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection**[2] **(mg/kg)**	**Benchmark Value (BM)**[3] **(mg/kg)**	**Hazard Quotient (HQ)**[4]	**Retained as COPC?**	**Rationale**
Aluminum	1	1	8,510	9,400	0.9	No	HQ<1
Antimony	1	0	ND (0.22)	0.49	nd	No	BM>ND
Arsenic	1	1	4.5	9.79	0.5	No	HQ<1
Barium	1	1	90.6	500	0.2	No	HQ<1
Beryllium	1	1	0.68	0.7	1.0	No	HQ<1
Cadmium	1	1	0.26	0.99	0.3	No	HQ<1
Chromium	1	1	6.1	43.4	0.1	No	HQ<1
Cobalt	1	1	4.8	20	0.2	No	HQ<1
Copper	1	1	7.8	31.6	0.2	No	HQ<1
Iron	1	1	11,600	10,000	1.2	Yes	HQ>1
Lead	1	1	11.2	35.8	0.3	No	HQ<1
Magnesium	1	1	3,770	6,100	0.6	No	HQ<1
Manganese	1	1	598	736	0.8	No	HQ<1
Mercury	1	0	ND (0.05)	0.18	nd	No	BM>ND
Nickel	1	1	5.6	22.7	0.2	No	HQ<1
Selenium	1	1	0.26	0.1	2.6	Yes	HQ>1
Silver	1	0	ND (0.07)	0.5	nd	No	BM>ND
Thallium	1	0	ND (0.11)	3.8	nd	No	BM>ND
Uranium	1	1	22.1	17	1.3	Yes	HQ>1
Vanadium	1	1	16.4	nb	nb	Yes	nb
Zinc	1	1	43.9	121	0.4	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-7. Identification of COPC in Sediment Composite Samples for Central Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	12,200	14,900	17,600	9,400	1.9	Yes	HQ>1
Antimony	2	0	ND (0.24)	nc	ND (0.24)	0.49	nd	No	BM>ND
Arsenic	2	2	3.2	10.5	17.8	9.79	1.8	Yes	HQ>1
Barium	2	2	143	161	178	500	0.4	No	HQ<1
Beryllium	2	2	1.2	1.5	1.8	0.7	2.6	Yes	HQ>1
Cadmium	2	2	1.4	1.5	1.6	0.99	1.6	Yes	HQ>1
Chromium	2	2	7.6	10.6	13.6	43.4	0.3	No	HQ<1
Cobalt	2	2	12.3	18.6	24.9	20	1.2	Yes	HQ>1
Copper	2	2	11.5	51.4	91.2	31.6	2.9	Yes	HQ>1
Iron	2	2	13,600	16,000	18,400	10,000	1.8	Yes	HQ>1
Lead	2	2	15.1	18.0	20.9	35.8	0.6	No	HQ<1
Magnesium	2	2	3,300	3,600	3,900	6,100	0.6	No	HQ<1
Manganese	2	2	1,620	2,045	2,470	736	3.4	Yes	HQ>1
Mercury	2	0	ND (0.06)	nc	ND (0.06)	0.18	nd	No	BM>ND
Nickel	2	2	23.7	31.4	39	22.7	1.7	Yes	HQ>1
Selenium	2	2	0.5	0.7	0.88	0.1	8.8	Yes	HQ>1
Silver	2	0	ND (0.07)	nc	ND (0.07)	0.5	nd	No	BM>ND
Thallium	2	2	0.17	0.2	0.2	3.8	0.1	No	HQ<1
Uranium	2	2	228	623	1,017	17	60	Yes	HQ>1
Vanadium	2	2	18.7	20.8	22.9	nb	nb	Yes	nb
Zinc	2	2	75.4	85.1	94.8	121	0.8	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ ≥1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-8. Identification of COPC in Sediment Composite Samples for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	6	6	10,600	13,900	15,900	9,400	1.7	Yes	HQ>1
Antimony	6	0	ND (0.29)	nc	ND (0.29)	0.49	nd	No	BM>ND
Arsenic	6	6	3.7	7.7	10.8	9.79	1.1	Yes	HQ>1
Barium	6	6	66.7	115	191	500	0.4	No	HQ<1
Beryllium	6	6	0.98	1.4	1.7	0.7	2.4	Yes	HQ>1
Cadmium	6	6	0.65	2.2	9.7	0.99	9.8	Yes	HQ>1
Chromium	6	6	13.6	18.3	22.6	43.4	0.5	No	HQ<1
Cobalt	6	6	9.6	18.1	23.3	20	1.2	Yes	HQ>1
Copper	6	6	10.1	16.3	21	31.6	0.7	No	HQ<1
Iron	6	6	11,800	15,217	17,500	10,000	1.8	Yes	HQ>1
Lead	6	6	8.1	10.5	11.8	35.8	0.3	No	HQ<1
Magnesium	6	6	3,010	3,635	4,380	6,100	0.7	No	HQ<1
Manganese	6	6	923	5,027	21,200	736	29	Yes	HQ>1
Mercury	6	0	ND (0.07)	nc	ND (0.07)	0.18	nd	No	BM>ND
Nickel	6	6	16	69.3	289	22.7	12.7	Yes	HQ>1
Selenium	6	6	0.6	1.4	3.9	0.1	39	Yes	HQ>1
Silver	6	0	ND (0.09)	nc	ND (0.09)	0.5	nd	No	BM>ND
Thallium	6	5	0.23	0.2	0.33	3.8	0.1	No	HQ<1
Uranium	8	8	5.4	33.2	57.5	17	3.4	Yes	HQ>1
Vanadium	6	6	16.2	20.5	22.7	nb	nb	Yes	nb
Zinc	6	6	45.1	108	301	121	2.5	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-9. Identification of COPC in Sediment Composite Samples for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	18,500	9,400	2.0	Yes	HQ>1
Antimony	1	0	ND (0.44)	0.49	nd	No	BM>ND
Arsenic	1	1	11.9	9.79	1.2	Yes	HQ>1
Barium	1	1	257	500	0.5	No	HQ<1
Beryllium	1	1	3.5	0.7	5.0	Yes	HQ>1
Cadmium	1	1	14.4	0.99	14.5	Yes	HQ>1
Chromium	1	1	23.1	43.4	0.5	No	HQ<1
Cobalt	1	1	31.9	20	1.6	Yes	HQ>1
Copper	1	1	22.1	31.6	0.7	No	HQ<1
Iron	1	1	18,500	10,000	1.9	Yes	HQ>1
Lead	1	1	16.1	35.8	0.4	No	HQ<1
Magnesium	1	1	4,150	6,100	0.7	No	HQ<1
Manganese	1	1	33,600	736	46	Yes	HQ>1
Mercury	1	0	ND (0.1)	0.18	nd	No	BM>ND
Nickel	1	1	516	22.7	23	Yes	HQ>1
Selenium	1	1	7.2	0.1	72	Yes	HQ>1
Silver	1	1	0.43	0.5	0.9	No	HQ<1
Thallium	1	1	0.3	3.8	0.1	No	HQ<1
Uranium	1	1	138	17	8.1	Yes	HQ>1
Vanadium	1	1	30.6	nb	nb	Yes	nb
Zinc	1	1	553	121	4.6	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-10. Identification of COPC in Sediment Composite Samples for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	1	1	3,010	3,010	3,010	9,400	0.3	No	HQ<1
Antimony	1	0	ND (0.25)	nc	ND (0.25)	0.49	nd	No	BM>ND
Arsenic	1	0	ND (0.46)	nc	ND (0.46)	9.79	nd	No	BM>ND
Barium	1	1	27	27	27	500	0.1	No	HQ<1
Beryllium	1	1	0.31	0.3	0.31	0.7	0.4	No	HQ<1
Cadmium	1	0	ND (0.02)	nc	ND (0.02)	0.99	nd	No	BM>ND
Chromium	1	1	2.3	2.3	2.3	43.4	0.1	No	HQ<1
Cobalt	1	1	1.2	1.2	1.2	20	0.1	No	HQ<1
Copper	1	1	1.1	1.1	1.1	31.6	0.0	No	HQ<1
Iron	1	1	5,130	5,130	5,130	10,000	0.5	No	HQ<1
Lead	1	1	3.9	3.9	3.9	35.8	0.1	No	HQ<1
Magnesium	1	1	828	828	828	6,100	0.1	No	HQ<1
Manganese	1	1	126	126	126	736	0.2	No	HQ<1
Mercury	1	0	ND (0.125)	nc	ND (0.125)	0.18	nd	No	BM>ND
Nickel	1	1	1.1	1.1	1.1	22.7	0.0	No	HQ<1
Selenium	1	0	ND (0.22)	nc	ND (0.22)	0.1	nd	Yes	BM<ND
Silver	1	0	ND (0.08)	nc	ND (0.08)	0.5	nd	No	BM>ND
Thallium	1	0	ND (0.12)	nc	ND (0.12)	3.8	nd	No	BM>ND
Uranium	3	3	6.86	9.6	11.7	17	0.4	No	HQ<1
Vanadium	1	1	7.9	7.9	7.9	nb	nb	Yes	nb
Zinc	1	1	13.4	13.4	13.4	121	0.1	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-11. Identification of COPC in Sediment Composite Samples for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	2,990	3,350	3,710	9,400	0.4	No	HQ<1
Antimony	2	0	ND (0.24)	nc	ND (0.24)	0.49	nd	No	BM>ND
Arsenic	2	2	1.4	1.5	1.5	9.79	0.2	No	HQ<1
Barium	2	2	38.5	39.8	41.1	500	0.1	No	HQ<1
Beryllium	2	2	0.36	0.4	0.51	0.7	0.7	No	HQ<1
Cadmium	2	2	0.19	0.6	1.1	0.99	1.1	Yes	HQ>1
Chromium	2	0	ND (2.2)	nc	ND (2.2)	43.4	nd	No	BM>ND
Cobalt	2	2	3.8	4.4	5	20	0.3	No	HQ<1
Copper	2	2	2.4	2.7	2.9	31.6	0.1	No	HQ<1
Iron	2	2	4,510	4,790	5,070	10,000	0.5	No	HQ<1
Lead	2	2	3.3	4.0	4.6	35.8	0.1	No	HQ<1
Magnesium	2	2	834	912	989	6,100	0.2	No	HQ<1
Manganese	2	2	915	2,303	3,690	736	5.0	Yes	HQ>1
Mercury	2	0	ND (0.12)	nc	ND (0.12)	0.18		No	BM>ND
Nickel	2	2	12.9	27.3	41.7	22.7	1.8	Yes	HQ>1
Selenium	2	0	ND (0.21)	nc	ND (0.21)	0.1	nd	Yes	BM<ND
Silver	2	0	ND (0.08)	nc	ND (0.08)	0.5	nd	No	BM>ND
Thallium	2	0	ND (0.13)	nc	ND (0.13)	3.8	nd	No	BM>ND
Uranium	7	7	3.6	21.1	90	17	5.3	Yes	HQ>1
Vanadium	2	2	6.3	7.0	7.7	nb	nb	Yes	nb
Zinc	2	2	25.8	40.9	55.9	121	0.5	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ ≥1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-12. Identification of COPC in Sediment Composite Samples for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	3,280	5,035	6,790	9,400	0.7	No	HQ<1
Antimony	2	0	0.26	nc	0.26	0.49	nd	No	BM>ND
Arsenic	2	2	1.8	3.8	5.8	9.79	0.6	No	HQ<1
Barium	2	2	29.6	39	48.3	500	0.1	No	HQ<1
Beryllium	2	2	0.35	0.4	0.45	0.7	0.6	No	HQ<1
Cadmium	2	2	0.03	0.1	0.08	0.99	0.1	No	HQ<1
Chromium	2	1	-2.9	4.6	7.7	43.4	0.2	No	HQ<1
Cobalt	2	2	3.5	4.6	5.7	20	0.3	No	HQ<1
Copper	2	2	2.6	4.9	7.1	31.6	0.2	No	HQ<1
Iron	2	2	6,450	9,475	12,500	10,000	1.3	Yes	HQ>1
Lead	2	2	4.4	5.6	6.7	35.8	0.2	No	HQ<1
Magnesium	2	2	1,300	2,510	3,720	6,100	0.6	No	HQ<1
Manganese	2	2	495	540	585	736	0.8	No	HQ<1
Mercury	2	0	0.1	nc	0.1	0.18	nd	No	BM>
Nickel	2	2	9.4	11.0	12.5	22.7	0.6	No	HQ<1
Selenium	2	0	0.22	nc	0.22	0.1	nd	Yes	BM<ND
Silver	2	0	0.08	nc	0.08	0.5	nd	No	BM>ND
Thallium	2	2	0.23	0.3	0.31	3.8	0.1	No	HQ<1
Uranium	2	2	6	7.0	7.9	17	0.5	No	HQ<1
Vanadium	2	2	8.2	11.7	15.1	nb	nb	Yes	nb
Zinc	2	2	28	35.7	43.4	121	0.4	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-13. Identification of COPC in Sediment Composite Samples for Franklin D. Roosevelt Lake
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	7,410	9,400	0.8	No	HQ<1
Antimony	1	0	ND (0.22)	0.49	nd	No	BM>ND
Arsenic	1	1	9.3	9.79	0.9	No	HQ<1
Barium	1	1	55.1	500	0.1	No	HQ<1
Beryllium	1	1	0.31	0.7	0.4	No	HQ<1
Cadmium	1	0	ND (0.02)	0.99	nd	No	BM>ND
Chromium	1	1	11.1	43.4	0.3	No	HQ<1
Cobalt	1	1	4.6	20	0.2	No	HQ<1
Copper	1	1	8.7	31.6	0.3	No	HQ<1
Iron	1	1	15,700	10,000	1.6	Yes	HQ>1
Lead	1	1	8.4	35.8	0.2	No	HQ<1
Magnesium	1	1	6,040	6,100	1.0	No	HQ<1
Manganese	1	1	241	736	0.3	No	HQ<1
Mercury	1	0	ND (0.1)	0.18	nd	No	BM>ND
Nickel	1	1	8.9	22.7	0.4	No	HQ<1
Selenium	1	1	0.61	0.1	6.1	Yes	HQ>1
Silver	1	0	ND (0.07)	0.5	nd	No	BM>ND
Thallium	1	1	0.22	3.8	0.1	No	HQ<1
Uranium	1	1	1.91	17	0.1	No	HQ<1
Vanadium	1	1	16.1	nb	nb	Yes	nb
Zinc	1	1	74.1	121	0.6	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-14. Identification of COPC in Sediment Composite Samples for Background
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	23	22	1,960	*10,000*	20,100	9,400	2.14	Yes	HQ>1
Antimony	23	3	0.46	0.3	2.1	0.49	4.29	Yes	HQ>1
Arsenic	23	22	0.88	*15.2*	52.2	9.79	5.33	Yes	HQ>1
Barium	23	23	1.2	*92.5*	258	500	0.52	No	HQ<1
Beryllium	23	23	0.002	*1.1*	2.5	0.7	3.57	Yes	HQ>1
Cadmium	23	20	0.02	*0.1*	0.68	0.99	0.69	No	HQ<1
Chromium	23	23	0.04	*9.9*	22.3	43.4	0.51	No	HQ<1
Cobalt	23	23	0.91	*7.0*	12.9	20	0.65	No	HQ<1
Copper	23	23	1	*14.8*	30.7	31.6	0.97	No	HQ<1
Iron	23	23	220	*14,100*	26,800	10,000	2.68	Yes	HQ>1
Lead	23	23	2	*10*	21	35.8	0.59	No	HQ<1
Magnesium	23	23	105	*1,800*	4,990	6,100	0.82	No	HQ<1
Manganese	23	23	87.6	*337*	871	736	1.18	Yes	HQ>1
Mercury	23	0	ND (0.05)	nc	ND (0.05)	0.18	nd	No	BM>ND
Molybdenum	5	5	0.03	2.3	8.4	nb	nb	Yes	nb
Nickel	23	23	0.35	*9.3*	23.8	22.7	1.05	Yes	HQ>1
Selenium	23	13	0.28	0.5	1.3	0.1	13.00	Yes	HQ>1
Silver	23	0	ND (0.02)	nc	ND (0.02)	0.5	nd	Yes	BM>ND
Thallium	23	11	0.11	0.2	0.38	3.8	0.10	No	HQ<1
Uranium	23	23	0.63	*9.2*	66.2	17	3.89	Yes	HQ>1
Vanadium	23	23	1.2	*21.7*	33.7	nb	nb	Yes	nb
Zinc	23	23	0.51	*28.7*	100	121	0.83	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark for Vanadium
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-15. Identification of COPC in Sediment Grab Samples for Pit 3
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	18,500	24,900	31,300	9,400	3.3	Yes	HQ>1
Antimony	2	0	ND (1.5)	nc	ND (1.5)	0.49	nd	Yes	BM<ND
Arsenic	2	2	2.8	28.8	54.7	9.79	5.6	Yes	HQ>1
Barium	2	2	9.7	263	516	500	1.0	Yes	HQ>1
Beryllium	2	2	6	6.5	7	0.7	10.0	Yes	HQ>1
Cadmium	2	0	ND (0.31)	nc	ND (0.31)	0.99	nd	No	BM>ND
Chromium	2	2	7.2	13.4	19.6	43.4	0.5	No	HQ<1
Cobalt	2	2	34.9	48.5	62.1	20	3.1	Yes	HQ>1
Copper	2	2	38	70	102	31.6	3.2	Yes	HQ>1
Iron	2	2	21,600	26,950	32,300	10,000	3.2	Yes	HQ>1
Lead	2	2	11.7	18.45	25.2	35.8	0.7	No	HQ<1
Magnesium	2	2	3,200	7,150	11,100	6,100	1.8	Yes	HQ>1
Manganese	2	2	1,300	1,325	1,350	736	1.8	Yes	HQ>1
Mercury	2	0	ND (0.16)	nc	ND (0.16)	0.18	nd	No	BM>ND
Nickel	2	2	54.6	71.1	87.6	22.7	3.9	Yes	HQ>1
Selenium	2	0	ND (1.2)	nc	ND (1.2)	0.1	nd	Yes	BM<ND
Silver	2	0	ND (0.6)	nc	ND (0.6)	0.5	nd	Yes	BM<ND
Thallium	2	0	ND (1.8)	nc	ND (1.8)	3.8	nd	No	BM>ND
Uranium	2	2	395	656	917	17	54	Yes	HQ>1
Vanadium	2	2	19.9	30.6	41.2	nb	nb	Yes	nb
Zinc	2	2	269	292	315	121	2.6	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-16. Identification of COPC in Sediment Grab Samples for Pit 4
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (mg/kg)**	**Central Tendency[3] (mg/kg)**	**Maximum Detection[4] (mg/kg)**	**Benchmark Value (BM)[5] (mg/kg)**	**Hazard Quotient (HQ)[6]**	**Retained as COPC?**	**Rationale**
Aluminum	3	3	8,130	19,843	29,900	9,400	3.2	Yes	HQ>1
Antimony	3	0	ND (1.2)	nc	ND (1.2)	0.49	nd	Yes	BM<ND
Arsenic	3	3	7.4	17	25.4	9.79	2.6	Yes	HQ>1
Barium	3	3	29.4	72	131	500	0.3	No	HQ<1
Beryllium	3	3	1.3	2	3.6	0.7	5.1	Yes	HQ>1
Cadmium	3	0	ND (0.23)	nc	ND (0.23)	0.99	nd	No	BM>ND
Chromium	3	3	7.4	19	30.5	43.4	0.7	No	HQ<1
Cobalt	3	3	9.1	18	23.1	20	1.2	Yes	HQ>1
Copper	3	3	9	19	26.7	31.6	0.8	No	HQ<1
Iron	3	3	12,100	25,300	35,200	10,000	3.5	Yes	HQ>1
Lead	3	3	7.6	18	29.7	35.8	0.8	No	HQ<1
Magnesium	3	3	1,950	4,770	7,130	6,100	1.2	Yes	HQ>1
Manganese	3	3	629	1,074	1,820	736	2.5	Yes	HQ>1
Mercury	3	0	ND (0.13)	nc	ND (0.13)	0.18	nd	No	BM>ND
Nickel	3	3	16.1	29	38.6	22.7	1.7	Yes	HQ>1
Selenium	3	0	ND (0.94)	nc	ND (0.94)	0.1	nd	Yes	BM<ND
Silver	3	0	ND (0.47)	nc	ND (0.47)	0.5	nd	No	BM>ND
Thallium	3	1	ND (1.4)	1	2.1	3.8	0.6	No	HQ<1
Uranium	3	3	179	421	772	17	45	Yes	HQ>1
Vanadium	3	3	14.3	29	46.1	nb	nb	Yes	nb
Zinc	3	3	35.3	64	79.8	121	0.7	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-17. Identification of COPC in Sediment Grab Samples for Blood Pool
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	20,600	23,300	26,000	9,400	2.8	Yes	HQ>1
Antimony	2	1	ND (1.3)	1.2	1.6	0.49	3.3	Yes	HQ>1
Arsenic	2	2	49.1	62.1	75	9.79	7.7	Yes	HQ>1
Barium	2	2	101	116	131	500	0.3	No	HQ<1
Beryllium	2	2	0.99	1.0	1.1	0.7	1.6	Yes	HQ>1
Cadmium	2	0	ND (0.28)	nc	ND (0.28)	0.99	nd	No	BM>ND
Chromium	2	2	35.4	43.1	50.7	43.4	1.2	Yes	HQ>1
Cobalt	2	2	5.9	8.6	11.3	20	0.6	No	HQ<1
Copper	2	2	64.1	76.0	87.8	31.6	2.8	Yes	HQ>1
Iron	2	2	51,000	59,200	67,400	10,000	6.7	Yes	HQ>1
Lead	2	2	18.5	19.8	21.1	35.8	0.6	No	HQ<1
Magnesium	2	2	4,600	6,330	8,060	6,100	1.3	Yes	HQ>1
Manganese	2	2	310	331	352	736	0.5	No	HQ<1
Mercury	2	0	ND (0.14)	nc	ND (0.14)	0.18	nd	No	BM>ND
Nickel	2	2	19.6	24.3	29	22.7	1.3	Yes	HQ>1
Selenium	2	0	ND (1.1)	nc	ND (1.1)	0.1	nd	Yes	BM<ND
Silver	2	0	ND (0.55)	nc	ND (0.55)	0.5	nd	Yes	BM<ND
Thallium	2	0	ND (1.7)	nc	ND (1.7)	3.8	nd	No	BM>ND
Uranium	2	2	47.5	75.8	104	17	6.1	Yes	HQ>1
Vanadium	2	2	51.4	58.9	66.3	nb	nb	Yes	nb
Zinc	2	2	72.1	73.3	74.5	121	0.6	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-18. Identification of COPC in Sediment Grab Samples for Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	15,800	87,900	160,000	9,400	17.0	Yes	HQ>1
Antimony	2	0	ND (1.3)	nc	ND (1.3)	0.49	nd	Yes	BM<ND
Arsenic	2	2	5.5	15.6	26.5	9.79	2.7	Yes	HQ>1
Barium	2	2	47.4	368	689	500	1.4	Yes	HQ>1
Beryllium	2	2	1.6	15.7	29.8	0.7	43	Yes	HQ>1
Cadmium	2	1	ND (.26)	5.7	11.2	0.99	11.3	Yes	HQ>1
Chromium	2	2	7.6	19.0	30.4	43.4	0.7	No	HQ<1
Cobalt	2	2	7.9	87	166	20	8.3	Yes	HQ>1
Copper	2	2	29	390	751	31.6	24	Yes	HQ>1
Iron	2	2	15,800	16,350	16,900	10,000	1.7	Yes	HQ>1
Lead	2	2	6.5	16	25.4	35.8	0.7	No	HQ<1
Magnesium	2	2	4,320	6,945	9,570	6,100	1.6	Yes	HQ>1
Manganese	2	2	442	2,386	4,330	736	5.9	Yes	HQ>1
Mercury	2	0	ND (0.13)	nc	ND (0.13)	0.18	nd	No	BM>ND
Nickel	2	2	17.5	387	757	22.7	33	Yes	HQ>1
Selenium	2	0	ND (1)	nc	ND (1)	0.1	nd	Yes	BM<ND
Silver	2	0	ND (0.52)	nc	ND (0.52)	0.5	nd	Yes	BM<ND
Thallium	2	0	ND (1.6)	nc	ND (1.6)	3.8	nd	No	BM>ND
Uranium	2	2	60.9	2,920	5,780	17	340	Yes	HQ>1
Vanadium	2	1	ND (1.6)	8.6	16.3	nb	nb	Yes	nb
Zinc	2	2	62.1	529	995	121	8.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ ≥1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-19. Identification of COPC in Sediment Grab Samples for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	20,100	9,400	2.1	Yes	HQ>1
Antimony	1	1	1.8	0.49	3.7	Yes	HQ>1
Arsenic	1	1	82.1	9.79	8.4	Yes	HQ>1
Barium	1	1	112	500	0.2	No	HQ<1
Beryllium	1	0	ND (1.9)	0.7	nd	Yes	BM<ND
Cadmium	1	1	0.75	0.99	0.8	No	HQ<1
Chromium	1	1	39.2	43.4	0.9	No	HQ<1
Cobalt	1	1	23.1	20	1.2	Yes	HQ>1
Copper	1	1	57.5	31.6	1.8	Yes	HQ>1
Iron	1	1	33,800	10,000	3.4	Yes	HQ>1
Lead	1	1	32.7	35.8	0.9	No	HQ<1
Magnesium	1	1	7,410	6,100	1.2	Yes	HQ>1
Manganese	1	1	3,090	736	4.2	Yes	HQ>1
Mercury	1	0	ND (0.16)	0.18	nd	No	BM>ND
Nickel	1	1	37.1	22.7	1.6	Yes	HQ>1
Selenium	1	0	ND (1.2)	0.1	nd	Yes	BM<ND
Silver	1	0	ND (0.62)	0.5	nd	Yes	BM<ND
Thallium	1	0	ND (1.9)	3.8	nd	No	BM>ND
Uranium	1	1	406	17	23.9	Yes	HQ>1
Vanadium	1	1	32.8	nb	nb	Yes	nb
Zinc	1	1	142	121	1.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-20. Identification of COPC in Sediment Grab Samples for Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	9	9	5,190	10,228	15,700	9,400	1.7	Yes	HQ>1
Antimony	3	0	ND (1.0)	nc	ND (1.0)	0.49	nd	Yes	BM<ND
Arsenic	9	3	2.8	3.6	5.8	9.79	0.6	No	HQ<1
Barium	9	9	31.5	55.9	76.3	500	0.2	No	HQ<1
Beryllium	9	9	0.78	1.8	4.1	0.7	5.9	Yes	HQ>1
Cadmium	9	6	0.4	0.5	1	0.99	1.0	Yes	HQ>1
Chromium	9	9	2.6	4.8	7.3	43.4	0.2	No	HQ<1
Cobalt	9	9	4.05	8.0	11.2	20	0.6	No	HQ<1
Copper	9	9	7.9	14.4	20.4	31.6	0.6	No	HQ<1
Iron	9	9	7,530	11,966	15,400	10,000	1.5	Yes	HQ>1
Lead	9	9	5	8.7	20	35.8	0.6	No	HQ<1
Magnesium	3	3	912	1,577	1,950	6,100	0.3	No	HQ<1
Manganese	9	9	443	1,147	3,130	736	4.3	Yes	HQ>1
Mercury	9	1	ND (0.02)	0.03	0.02	0.18	0.1	No	HQ<1
Nickel	9	9	3.6	16.7	28	22.7	1.2	Yes	HQ>1
Selenium	9	1	ND (0.82)	2.6	4	0.1	40	Yes	HQ>1
Silver	9	6	0.06	0.1	0.14	0.5	0.3	No	HQ<1
Thallium	9	6	0.11	0.3	0.19	3.8	0.1	No	HQ<1
Uranium	7	7	27.2	140	293	17	17.2	Yes	HQ>1
Vanadium	3	3	6.8	10.3	12.8	nb	nb	Yes	nb
Zinc	9	9	21.9	53.8	93	121	0.8	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-21. Identification of COPC in Sediment Grab Samples for Central Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	12,000	16,600	21,200	9,400	2.3	Yes	HQ>1
Antimony	2	0	ND (1.1)	nc	ND (1.1)	0.49	nd	Yes	BM<ND
Arsenic	2	2	8.3	9.9	11.4	9.79	1.2	Yes	HQ>1
Barium	2	2	55.1	87.1	119	500	0.2	No	HQ<1
Beryllium	2	2	2	3.1	4.2	0.7	6.0	Yes	HQ>1
Cadmium	2	2	1.6	2.2	2.8	0.99	2.8	Yes	HQ>1
Chromium	2	2	11.2	18.1	25	43.4	0.6	No	HQ<1
Cobalt	2	2	20.3	59.8	99.2	20	5.0	Yes	HQ>1
Copper	2	2	25.9	27.5	29.1	31.6	0.9	No	HQ<1
Iron	2	2	11,400	16,250	21,100	10,000	2	Yes	HQ>1
Lead	2	2	13.4	14.2	15	35.8	0.4	No	HQ<1
Magnesium	2	2	2,230	3,990	5,750	6,100	0.9	No	HQ<1
Manganese	2	2	1,220	2,965	4,710	736	6.4	Yes	HQ>1
Mercury	2	0	ND (1.1)	nc	ND (1.1)	0.18	nd	Yes	BM<ND
Nickel	2	2	81.5	156	230	22.7	10.1	Yes	HQ>1
Selenium	2	1	ND (0.86)	2.8	5.2	0.1	52	Yes	HQ>1
Silver	2	0	ND (0.43)	nc	ND (0.43)	0.5	nd	No	BM>ND
Thallium	2	0	ND (1.3)	nc	ND (1.3)	3.8	nd	No	BM>ND
Uranium	2	2	144	1,892	3,640	17	214	Yes	HQ>1
Vanadium	2	1	ND (0.21)	14.2	28.2	nb	nb	Yes	nb
Zinc	2	1	117	358	598	121	4.9	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-22. Identification of COPC in Sediment Grab Samples for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection**[2] **(mg/kg)**	**Central Tendency**[3] **(mg/kg)**	**Maximum Detection**[4] **(mg/kg)**	**Benchmark Value (BM)**[5] **(mg/kg)**	**Hazard Quotient (HQ)**[6]	**Retained as COPC?**	**Rationale**
Aluminum	7	7	5,200	10,706	20,800	9,400	2.2	Yes	HQ>1
Antimony	3	0	ND (1.3)	nc	ND (1.3)	0.49	nd	Yes	BM<ND
Arsenic	7	4	3.3	6.3	17.8	9.79	1.8	Yes	HQ>1
Barium	7	7	35.3	81.0	135	500	0.3	No	HQ<1
Beryllium	7	5	0.4	0.7	1.3	0.7	1.9	Yes	HQ>!
Cadmium	7	2	0.4	0.4	0.7	0.99	0.7	No	HQ<1
Chromium	7	7	5.4	12.6	24.2	43.4	0.6	No	HQ<1
Cobalt	7	7	5.19	11.6	23.3	20	1.2	Yes	HQ>1
Copper	7	7	3.6	12.7	29.9	31.6	0.9	No	HQ<1
Iron	7	7	10,200	14,429	25,800	10,000	3	Yes	HQ>1
Lead	7	5	4	6.9	15.3	35.8	0.4	No	HQ<1
Magnesium	3	3	2,920	4,540	6,700	6,100	1.1	Yes	HQ>1
Manganese	7	7	524	1,127	2,240	736	3.0	Yes	HQ>1
Mercury	7	0	ND (0.02)	nc	ND (0.02)	0.18	nd	No	BM>ND
Nickel	7	7	9	16.9	34.9	22.7	1.5	Yes	HQ>1
Selenium	7	0	ND (1)	nc	ND (1)	0.1	nd	Yes	BM<ND
Silver	7	3	0.1	0.2	0.66	0.5	1.3	Yes	HQ>1
Thallium	7	4	0.08	0.5	0.19	3.8	0.1	No	HQ<1
Uranium	5	5	8.3	29.5	78.5	17	4.6	Yes	HQ>1
Vanadium	3	3	13.2	23.2	35.5	nb	nb	Yes	nb
Zinc	7	7	28	52.3	97.7	121	0.8	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-23. Identification of COPC in Sediment Grab Samples for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (mg/kg)**	**Central Tendency[3] (mg/kg)**	**Maximum Detection[4] (mg/kg)**	**Benchmark Value (BM)[5] (mg/kg)**	**Hazard Quotient (HQ)[6]**	**Retained as COPC?**	**Rationale**
Aluminum	4	4	9,740	15,110	22,400	9,400	2.4	Yes	HQ>1
Antimony	2	0	ND (2.4)	nc	ND (2.4)	0.49	nd	Yes	BM<ND
Arsenic	4	3	10	9.5	14.7	9.79	1.5	Yes	HQ>1
Barium	4	4	93.7	183	254	500	0.5	No	HQ<1
Beryllium	4	4	0.75	2.0	3.8	0.7	5.4	Yes	HQ>1
Cadmium	4	4	1.7	6.1	9.6	0.99	9.7	Yes	HQ>1
Chromium	4	4	8.2	17.0	27	43.4	0.6	No	HQ<1
Cobalt	4	4	9.93	23.2	35.9	20	1.8	Yes	HQ>1
Copper	4	4	7.6	16.4	29.8	31.6	0.9	No	HQ<1
Iron	4	4	10,800	15,500	21,600	10,000	2	Yes	HQ>1
Lead	4	3	6	9.5	16.5	35.8	0.5	No	HQ<1
Magnesium	2	2	5,030	5,240	5,450	6,100	0.9	No	HQ<1
Manganese	4	4	6,040	16,285	24,300	736	33	Yes	HQ>1
Mercury	4	0	ND (0.02)	nc	ND (0.02)	0.18	nd	No	BM>ND
Nickel	4	4	64	184	309	22.7	13.6	Yes	HQ>1
Selenium	4	3	6	9.1	16	0.1	160	Yes	HQ>1
Silver	4	2	0.1	0.3	0.1	0.5	0.2	No	HQ<1
Thallium	4	2	0.14	0.8	0.18	3.8	0.0	No	HQ<1
Uranium	4	4	17.1	52.1	83.8	17	4.9	Yes	HQ>1
Vanadium	2	2	29	31.4	33.8	nb	nb	Yes	nb
Zinc	4	4	92	239	395	121	3.3	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ ≥1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-24. Identification of COPC in Sediment Grab Samples for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	10	10	2,360	3,265	4,210	9,400	0.4	No	HQ<1
Antimony	1	0	ND (1.2)	nc	ND (1.2)	0.49	nd	Yes	BM<ND
Arsenic	10	4	4	3.1	6	9.79	0.6	No	HQ<1
Barium	10	10	23.1	33.9	71.6	500	0.1	No	HQ<1
Beryllium	10	9	0.2	0.3	0.56	0.7	0.8	No	HQ<1
Cadmium	10	1	ND (0.2)	0.2	1	0.99	1.0	Yes	HQ>1
Chromium	10	10	1.6	2.3	3.1	43.4	0.1	No	HQ<1
Cobalt	10	10	1	2.9	15	20	0.8	No	HQ<1
Copper	10	8	1	2.3	4.1	31.6	0.1	No	HQ<1
Iron	10	10	4,310	5,652	6,720	10,000	0.7	No	HQ<1
Lead	10	6	4	4.0	7	35.8	0.2	No	HQ<1
Magnesium	1	1	1,020	1,020	1,020	6,100	0.2	No	HQ<1
Manganese	10	10	116	875	7,480	736	10.2	Yes	HQ>1
Mercury	10	0	ND (0.02)	nc	ND (0.02)	0.18	nd	No	BM>ND
Nickel	10	8	1	4.3	32	22.7	1.4	Yes	HQ>1
Selenium	10	0	ND (0.95)	nc	ND (4)	0.1	nd	Yes	BM<ND
Silver	10	0	ND (0.05)	nc	ND (0.05)	0.5	nd	No	BM>ND
Thallium	10	7	0.08	0.2	0.2	3.8	0.1	No	HQ<1
Uranium	8	8	5.12	10.5	19.7	17	1.2	Yes	HQ>1
Vanadium	1	1	9.2	9.2	9.2	nb	nb	Yes	nb
Zinc	10	10	10	18.9	41	121	0.3	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-25. Identification of COPC in Sediment Grab Samples for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	17	17	1,860	6,015	21,600	9,400	2.3	Yes	HQ>1
Antimony	5	0	ND (1.2)	nc	ND (1.2)	0.49	nd	Yes	BM<ND
Arsenic	17	10	1.9	8.0	80	9.79	8.2	Yes	HQ>1
Barium	17	17	16.9	76.2	663	500	1.3	Yes	HQ>1
Beryllium	17	14	0.3	0.6	2.68	0.7	3.8	Yes	HQ>1
Cadmium	17	16	0.3	1.0	9.6	0.99	9.7	Yes	HQ>1
Chromium	17	17	1.4	4.0	13	43.4	0.3	No	HQ<1
Cobalt	17	17	2	12.1	139	20	7.0	Yes	HQ>1
Copper	17	17	1	5.1	20	31.6	0.6	No	HQ<1
Iron	17	17	3,730	9,161	30,500	10,000	3	Yes	HQ>1
Lead	17	12	4	5.6	13.3	35.8	0.4	No	HQ<1
Magnesium	5	5	1,390	1,822	3,220	6,100	0.5	No	HQ<1
Manganese	17	17	560	5,086	63,300	736	86.0	Yes	HQ>1
Mercury	17	1	ND (0.02)	nc	0.03	0.18	0.2	No	HQ<1
Nickel	17	17	5	45.3	460	22.7	20.3	Yes	HQ>1
Selenium	17	2	1.3	2.8	1.4	0.1	14.0	Yes	HQ>1
Silver	17	1	ND (0.05)	nc	0.09	0.5	0.2	No	HQ<1
Thallium	17	3	0.05	0.3	0.47	3.8	0.1	No	HQ<1
Uranium	12	12	6.61	16.4	47	17	2.8	Yes	HQ>1
Vanadium	5	5	10	13.7	25.9	nb	nb	Yes	nb
Zinc	17	17	19	69.5	520	121	4.3	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-26. Identification of COPC in Sediment Grab Samples for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (mg/kg)**	**Central Tendency[3] (mg/kg)**	**Maximum Detection[4] (mg/kg)**	**Benchmark Value (BM)[5] (mg/kg)**	**Hazard Quotient (HQ)[6]**	**Retained as COPC?**	**Rationale**
Aluminum	4	4	8,200	11,275	17,500	9,400	1.9	Yes	HQ>1
Antimony	4	0	ND (1.3)	nc	ND (1.3)	0.49	nd	Yes	BM<ND
Arsenic	4	4	6.6	9.2	11.9	9.79	1.2	Yes	HQ>1
Barium	4	4	54.4	79.9	138	500	0.3	No	HQ<1
Beryllium	4	4	0.43	0.8	1.4	0.7	2.0	Yes	HQ>1
Cadmium	4	1	ND (0.27)	0.4	1	0.99	1.0	Yes	HQ =1
Chromium	4	4	8	9.9	11.1	43.4	0.3	No	HQ<1
Cobalt	4	4	4.6	8.4	16.5	20	0.8	No	HQ<1
Copper	4	4	9.3	12.1	16.2	31.6	0.5	No	HQ<1
Iron	4	4	14,500	16,175	17,400	10,000	2	Yes	HQ>1
Lead	4	4	8	9.1	10.8	35.8	0.3	No	HQ<1
Magnesium	4	4	3,130	4,775	6,480	6,100	1.1	Yes	HQ>1
Manganese	4	4	447	1,328	3,670	736	5.0	Yes	HQ>1
Mercury	4	0	ND (0.14)	nc	ND (0.14)	0.18	nd	No	BM>ND
Nickel	4	4	10.7	22.8	51.4	22.7	2.3	Yes	HQ>1
Selenium	4	0	ND (1.1)	nc	ND (1.1)	0.1	nd	Yes	BM<ND
Silver	4	0	ND (0.53)	nc	ND (0.53)	0.5	nd	Yes	BM<ND
Thallium	4	0	ND (1.6)	nc	ND (1.6)	3.8	nd	No	BM>ND
Uranium	4	4	4.23	15.9	28.6	17	1.7	Yes	HQ>1
Vanadium	4	4	16.3	19.7	23.3	nb	nb	Yes	nb
Zinc	4	4	46	68.5	118	121	1.0	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-27. Identification of COPC in Sediment Grab Samples for Franklin D. Roosevelt Lake
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	9,600	9,400	1.0	Yes	HQ>1
Antimony	1	0	ND (1.2)	0.49	nd	Yes	BM<ND
Arsenic	1	1	12.8	9.79	1.3	Yes	HQ>1
Barium	1	1	79.9	500	0.2	No	HQ<1
Beryllium	1	1	0.37	0.7	0.5	No	HQ<1
Cadmium	1	0	ND (0.24)	0.99	nd	No	BM>ND
Chromium	1	1	17.3	43.4	0.4	No	HQ<1
Cobalt	1	1	6.9	20	0.3	No	HQ<1
Copper	1	1	11.3	31.6	0.4	No	HQ<1
Iron	1	1	20,800	10,000	2	Yes	HQ>1
Lead	1	1	13.7	35.8	0.4	No	HQ<1
Magnesium	1	1	6,170	6,100	1.0	Yes	HQ>1
Manganese	1	1	274	736	0.4	No	HQ<1
Mercury	1	0	ND (0.12)	0.18	nd	No	BM>ND
Nickel	1	1	11.5	22.7	0.5	No	HQ<1
Selenium	1	0	ND (0.95)	0.1	nd	Yes	BM<ND
Silver	1	0	ND (0.48)	0.5	nd	No	BM>ND
Thallium	1	0	ND (1.4)	3.8	nd	No	BM>ND
Uranium	1	1	2.6	17	0.2	No	HQ<1
Vanadium	1	1	25.1	nb	nb	Yes	nb
Zinc	1	1	154	121	1.3	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table E-28. Identification of COPC in Sediment Grab Samples for Background
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	23	23	0.2	*10,600*	32,100	9,400	3.4	Yes	HQ>1
Antimony	23	3	0.36	0.2	1	0.49	2.0	Yes	HQ>1
Arsenic	23	21	0.55	*14.8*	123	9.79	12.6	Yes	HQ>1
Barium	23	23	2.6	*89*	348	500	0.7	No	HQ<1
Beryllium	23	22	0.24	*1.1*	4.2	0.7	6.0	Yes	HQ>1
Cadmium	23	21	0.03	*0.1*	0.69	0.99	0.7	No	HQ<1
Calcium	23	23	151	*1,760*	10100	nb	nb	Yes	nb
Chromium	23	22	1.1	*10.8*	23	43.4	0.5	No	HQ<1
Cobalt	23	23	0.92	*5.9*	13.9	20	0.7	No	HQ<1
Copper	23	23	0.79	*16.4*	45.7	31.6	1.4	Yes	HQ>1
Iron	23	23	289	*15,200*	34,500	10,000	3.5	Yes	HQ>1
Lead	23	23	2.1	*12*	20.2	35.8	0.6	No	HQ<1
Magnesium	23	23	55.5	*1,910*	4,900	6,100	0.8	No	HQ<1
Manganese	23	23	56.9	*419*	1,420	736	1.9	Yes	HQ>1
Mercury	23	0	ND (0.05)	nc	ND (0.05)	0.18	nd	No	BM>ND
Molybdenum	5	5	0.03	1.9	3.9	nb	nb	Yes	nb
Nickel	23	23	0.72	*8.7*	25.6	22.7	1.1	Yes	HQ>1
Potassium	23	23	90.7	*1,630*	6,360	nb	nb	Yes	nb
Selenium	23	13	0.34	0.5	1.6	0.1	16	Yes	HQ>1
Silver	23	0	ND (0.02)	nc	ND (0.02)	0.5	nd	No	BM>ND
Sodium	23	23	21.4	*102*	276	nb	nb	Yes	nb
Thallium	23	10	0.17	0.2	0.45	3.8	0.1	No	HQ<1
Uranium	23	23	0.76	*9.7*	107	17	6.3	Yes	HQ>1
Vanadium	23	23	0.75	*23.1*	45.4	nb	nb	Yes	nb
Zinc	23	23	1.1	*25.6*	113	121	0.9	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Appendix F - Riparian Sediment Screening Tables
Midnite Mine Site
Wellpinit, Washington

Table F-1. Identification of COPC in Riparian Sediments for Western Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	8	8	0.41	8,390	13,900	9,400	1.5	Yes	HQ>1
Antimony	8	1	ND (0.11)	0.5	1.1	0.49	2.2	Yes	HQ>1
Arsenic	8	8	0.07	4.7	9	9.79	0.9	No	HQ<1
Barium	8	8	0.17	58.3	106	500	0.2	No	HQ<1
Beryllium	8	6	0.57	0.7	1.2	0.7	1.7	Yes	HQ>1
Cadmium	8	3	0.09	0.2	0.51	0.99	0.5	No	HQ<1
Chromium	8	7	0.04	8.8	27.9	43.4	0.6	No	HQ<1
Cobalt	8	8	0.2	7.4	17.5	20	0.9	No	HQ<1
Copper	8	8	2	9.9	14.9	31.6	0.5	No	HQ<1
Iron	8	8	40.4	9,849	16,500	10,000	1.7	Yes	HQ>1
Lead	8	8	0.49	8.8	15.6	35.8	0.4	No	HQ<1
Magnesium	8	8	111	2,376	4,450	6,100	0.7	No	HQ<1
Manganese	8	8	49.1	890	2,500	736	3.4	Yes	HQ>1
Mercury	4	0	ND (0.05)	nc	ND (0.05)	0.18	nd	No	BM>ND
Molybdenum	8	7	0.1	1.6	3.4	nb	nb	Yes	nb
Nickel	8	7	1.2	9.8	20.1	22.7	0.9	No	HQ<1
Selenium	8	2	0.2	0.4	2.7	0.1	27.0	Yes	HQ>1
Silver	8	0	ND (0.02)	nc	ND (0.02)	0.5	nd	No	BM>ND
Thallium	6	4	0.09	0.1	0.32	3.8	0.1	No	HQ<1
Uranium	6	6	29.4	79.0	113	17	6.6	Yes	HQ>1
Vanadium	8	8	0.11	19.4	48.5	nb	nb	Yes	nb
Zinc	8	8	4	31.0	50.1	121	0.4	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table F-2. Identification of COPC in Riparian Sediments for Central Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	5	4	13,400	17,280	30,500	9,400	3.2	Yes	HQ>1
Antimony	5	2	0.74	0.6	1.2	0.49	2.4	Yes	HQ>1
Arsenic	5	5	0.23	20.8	37.7	9.8	3.9	Yes	HQ>1
Barium	5	5	0.41	87.5	145	500	0.3	No	HQ<1
Beryllium	5	5	0.004	3.8	10.3	0.7	14.7	Yes	HQ>1
Cadmium	5	5	0.71	2.3	4.3	0.99	4.3	Yes	HQ>1
Chromium	5	4	11.4	13.4	21.6	43.4	0.5	No	HQ<1
Cobalt	5	5	0.34	55	114	20	5.7	Yes	HQ>1
Copper	5	5	6.4	36	68.5	31.6	2.2	Yes	HQ>1
Iron	5	5	73.5	17,735	29,200	10,000	2.9	Yes	HQ>1
Lead	5	5	1.9	16	23.4	35.8	0.7	No	HQ<1
Magnesium	5	5	275	4,733	7,050	6,100	1.2	Yes	HQ>1
Manganese	5	5	93.6	2,177	3,970	736	5.4	Yes	HQ>1
Mercury	2	0	-0.05	nc	ND (0.05)	0.18	nd	No	BM>ND
Molybdenum	5	5	0.15	4.1	7.5	nb	nb	Yes	nb
Nickel	5	5	10.7	113	281	22.7	12.4	Yes	HQ>1
Selenium	5	1	ND (0.05)	0.1	0.27	0.1	2.7	Yes	HQ>1
Silver	5	0	ND (0.02)	nc	ND (0.02)	0.5	nd	No	BM>ND
Thallium	3	2	0.23	0.7	1.8	3.8	0.5	No	HQ<1
Uranium	3	3	460	1,084	2,271	17	134	Yes	HQ>1
Vanadium	5	5	0.17	22.5	36.8	nb	nb	Yes	nb
Zinc	5	5	19.9	326	866	121	7.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table F-3. Identification of COPC in Riparian Sediments for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	4	4	11,800	16,925	21,000	9,400	2.2	Yes	HQ>1
Antimony	4	1	ND (0.78)	0.5	0.69	0.49	1.4	Yes	HQ>1
Arsenic	4	4	2.4	7.4	9.9	9.79	1.0	Yes	HQ>1
Barium	4	4	85.8	109	136	500	0.3	No	HQ<1
Beryllium	4	4	0.58	1.1	1.3	0.7	1.9	Yes	HQ>1
Cadmium	4	1	ND (0.5)	0.3	0.5	0.99	0.5	No	HQ<1
Chromium	4	4	9.5	15.8	22.3	43.4	0.5	No	HQ<1
Cobalt	4	4	4.9	8.7	12.2	20	0.6	No	HQ<1
Copper	4	4	10.3	17.0	22.1	31.6	0.7	No	HQ<1
Iron	4	4	12,500	17,325	20,300	10,000	2.0	Yes	HQ>1
Lead	4	4	14.3	16.7	21.3	35.8	0.6	No	HQ<1
Magnesium	4	4	2,660	4,293	6,420	6,100	1.1	Yes	HQ>1
Manganese	4	4	347	632	1,090	736	1.5	Yes	HQ>1
Mercury	4	0	ND (0.06)	nc	ND (0.06)	0.18	nd	No	BM>ND
Molybdenum	4	3	1.6	1.7	3.3	nb	nb	Yes	nb
Nickel	4	4	9	17.2	24.3	22.7	1.1	Yes	HQ>1
Selenium	4	0	ND (0.3)	0.2	ND (0.3)	0.1	nd	Yes	BM<ND
Silver	4	0	ND (0.1)	nc	ND (0.1)	0.5	nd	No	BM>ND
Thallium	4	4	0.17	0.2	0.29	3.8	0.1	No	HQ<1
Uranium	4	4	20.4	24.9	35.4	17	2.1	Yes	HQ>1
Vanadium	4	4	17.1	25.6	30.4	nb	nb	Yes	nb
Zinc	4	4	48.1	54.9	65.6	121	0.5	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table F-4. Identification of COPC in Riparian Sediments for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient (HQ)[6]	Retained as COPC?	Rationale
Aluminum	2	2	16,200	19,400	22,600	9,400	2.4	Yes	HQ>1
Antimony	1	0	ND (1.4)	nc	ND (1.4)	0.49	nd	Yes	BM<ND
Arsenic	2	2	8.9	13.9	18.9	9.79	1.9	Yes	HQ>1
Barium	2	2	162	178	193	500	0.4	No	HQ<1
Beryllium	2	2	2.3	2.9	3.4	0.7	4.9	Yes	HQ>1
Cadmium	2	2	3.8	7.3	10.8	0.99	10.9	Yes	HQ>1
Chromium	2	2	16.9	21.6	26.2	43.4	0.6	No	HQ<1
Cobalt	2	2	21.8	25.7	29.5	20	1.5	Yes	HQ>1
Copper	2	2	22.4	24.8	27.2	31.6	0.9	No	HQ<1
Iron	2	2	16,300	20,200	24,100	10,000	2.4	Yes	HQ>1
Lead	2	2	16.8	17.4	18	35.8	0.5	No	HQ<1
Magnesium	2	2	3,900	4,440	4,980	6,100	0.8	No	HQ<1
Manganese	2	2	7,500	12,300	17,100	736	23.2	Yes	HQ>1
Mercury	1	0	ND (0.08)	nc	ND (0.08)	0.18	nd	No	BM>ND
Molybdenum	2	2	4.1	6.6	9	nb	nb	Yes	nb
Nickel	2	2	129	183	237	22.7	10.4	Yes	HQ>1
Selenium	2	1	ND (0.45)	0.4	0.59	0.1	5.9	Yes	HQ>1
Silver	2	1	ND (0.15)	0.2	0.32	0.5	0.6	No	HQ<1
Thallium	1	1	0.22	0.2	0.22	3.8	0.1	No	HQ<1
Uranium	1	1	126	126	126	17	7.4	Yes	HQ>1
Vanadium	2	2	25	30.7	36.3	nb	nb	Yes	nb
Zinc	2	2	181	243	305	121	2.5	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table F-5. Identification of COPC in Riparian Sediments for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (mg/kg)**	**Central Tendency[3] (mg/kg)**	**Maximum Detection[4] (mg/kg)**	**Benchmark Value (BM)[5] (mg/kg)**	**Hazard Quotient (HQ)[6]**	**Retained as COPC?**	**Rationale**
Aluminum	8	8	1.5	7,679	12,600	9,400	1.3	Yes	HQ>1
Antimony	5	1	ND (0.1)	0.5	0.64	0.49	1.3	Yes	HQ>1
Arsenic	8	8	0.16	3.2	5.2	9.79	0.5	No	HQ<1
Barium	8	8	0.35	69.4	159	500	0.3	No	HQ<1
Beryllium	8	8	0.006	0.8	1.4	0.7	2.0	Yes	HQ>1
Cadmium	8	8	0.15	0.7	1.2	0.99	1.2	Yes	HQ>1
Chromium	8	8	0.04	6.2	9.4	43.4	0.2	No	HQ<1
Cobalt	8	8	0.58	8.9	17.9	20	0.9	No	HQ<1
Copper	8	8	1.7	7.9	12.7	31.6	0.4	No	HQ<1
Iron	8	8	131	10,176	14,400	10,000	1.4	Yes	HQ>1
Lead	8	8	2.5	9.1	13.5	35.8	0.4	No	HQ<1
Magnesium	8	8	114	2,024	3,020	6,100	0.5	No	HQ<1
Manganese	8	8	86.5	1,839	3,780	736	5.1	Yes	HQ>1
Mercury	4	0	ND (0.05)	nc	ND (0.05)	0.18	nd	No	BM>ND
Molybdenum	8	8	0.19	0.8	1.4	nb	nb	Yes	nb
Nickel	8	8	2.6	29.2	53	22.7	2.3	Yes	HQ>1
Selenium	8	2	0.31	0.2	0.32	0.1	3.2	Yes	HQ>1
Silver	8	0	ND (0.02)	nc	ND (0.02)	0.5	nd	No	BM>ND
Thallium	5	4	0.16	0.2	0.22	3.8	0.1	No	HQ<1
Uranium	5	5	32.1	39.2	45	17	2.6	Yes	HQ>1
Vanadium	8	8	0.27	15.2	21.5	nb	nb	Yes	nb
Zinc	8	8	5.8	65.2	105	121	0.9	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table F-6. Identification of COPC in Riparian Sediments for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient (HQ)[4]	Retained as COPC?	Rationale
Aluminum	1	1	7,120	9,400	0.8	No	HQ<1
Antimony	1	1	0.78	0.49	1.6	Yes	HQ>1
Arsenic	1	1	8.7	9.79	0.9	No	HQ<1
Barium	1	1	56.1	500	0.1	No	HQ<1
Beryllium	1	1	0.38	0.7	0.5	No	HQ<1
Cadmium	1	1	0.13	0.99	0.1	No	HQ<1
Chromium	1	1	8.8	43.4	0.2	No	HQ<1
Cobalt	1	1	4.7	20	0.2	No	HQ<1
Copper	1	1	9.4	31.6	0.3	No	HQ<1
Iron	1	1	14,100	10,000	1.4	Yes	HQ>1
Lead	1	1	8.5	35.8	0.2	No	HQ<1
Magnesium	1	1	4,670	6,100	0.8	No	HQ<1
Manganese	1	1	414	736	0.6	No	HQ<1
Mercury	1	0	ND (0.04)	0.18	nd	No	BM>ND
Molybdenum	1	1	0.21	nb	nb	Yes	nb
Nickel	1	1	9.9	22.7	0.4	No	HQ<1
Selenium	1	1	0.26	0.1	2.6	Yes	HQ>1
Silver	1	0	ND (0.08)	0.5	nd	No	BM>ND
Thallium	1	1	0.07	3.8	0.0	No	HQ<1
Uranium	1	1	8.65	17	0.5	No	HQ<1
Vanadium	1	1	16.3	nb	nb	Yes	nb
Zinc	1	1	41.7	121	0.3	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Appendix G - Soil Screening Tables
Midnite Mine Site
Wellpinit, Washington

Table G-1. Identification of COPC in Surface Level Soil of Mined Area
Midnite Mine Site
Wellpinit, WA

Analyte[1]	**Number of Samples**	**Number of Detects**	**Minimum Detection[2] (mg/kg)**	**Central Tendency[3] (mg/kg)**	**Maximum Detection[4] (mg/kg)**	**Benchmark Value (BM)[5] (mg/kg)**	**Hazard Quotient[5] (HQ)**	**Retained as COPC?**	**Rationale**
Aluminum	65	65	4,140	*15,400*	33,700	50	674.0	Yes	HQ>1
Antimony	27	16	0.65	0.6	0.78	5	0.2	No	HQ<1
Arsenic	65	59	4	*17*	239	10	23.9	Yes	HQ>1
Barium	65	65	18.7	*101*	267	500	0.5	No	HQ<1
Beryllium	65	63	0.51	*1.3*	6.41	10	0.6	No	HQ<1
Cadmium	65	52	0.1	*0.3*	3.5	3	1.2	Yes	HQ>1
Chromium	65	65	2.9	*16.5*	66	0.4	165	Yes	HQ>1
Cobalt	65	65	2	*11.5*	19.9	20	1.0	Yes	HQ=1
Copper	65	64	5.7	*25.6*	83	50	1.7	Yes	HQ>1
Iron	65	65	7,750	*24,500*	65,300	200	327	Yes	HQ>1
Lead	65	65	6	*16*	84	50	1.7	Yes	HQ>1
Magnesium	27	27	1,420	*4,580*	10,500	nb	nb	Yes	nb
Manganese	65	65	309	*824*	5,190	100	51.9	Yes	HQ>1
Mercury	65	44	0.03	*0.02*	0.05	0.1	0.5	No	HQ<1
Molybdenum	16	6	2.5	10.1	31.9	2	16.0	Yes	HQ>1
Nickel	65	38	3	*16*	44	30	1.5	Yes	HQ>1
Selenium	65	61	4	*4.0*	90	1	90.0	Yes	HQ>1
Silver	65	60	0.07	*0.1*	1.18	2	0.6	No	HQ<1
Thallium	65	65	0.17	*0.4*	2.5	1	2.5	Yes	HQ>1
Uranium	27	27	12.6	*81.4*	482	5	96.4	Yes	HQ>1
Vanadium	27	27	9.4	*28.2*	132	2	66.0	Yes	HQ>1
Zinc	65	56	29	*52*	381	50	7.6	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1 or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-2. Identification of COPC in Surface Level Soil of Northeast Potentially Impacted Area (PIA)
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Aluminum	25	25	13,400	*18,900*	29,500	50	590	Yes	HQ>1
Antimony	25	25	0.65	*1.1*	1.5	5	0.3	No	HQ<1
Arsenic	25	25	2	*3.8*	50.5	10	5.1	Yes	HQ>1
Barium	25	25	149	*244*	364	500	0.7	No	HQ<1
Beryllium	25	25	0.43	*0.8*	1.9	10	0.2	No	HQ<1
Cadmium	25	16	0.23	*0.3*	0.8	3	0.3	No	HQ<1
Chromium	25	25	12.7	*16.7*	29.1	0.4	73	Yes	HQ>1
Cobalt	25	25	6.3	*11*	15.7	20	0.8	No	HQ<1
Copper	25	25	10.3	*17.5*	32.2	50	0.6	No	HQ<1
Iron	25	25	12,900	*18,700*	28,900	200	145	Yes	HQ>1
Lead	25	25	8.2	*15.2*	27.1	50	0.5	No	HQ<1
Magnesium	25	25	2,600	*3,820*	13,900	nb	nb	Yes	nb
Manganese	25	25	532	*833*	1,990	100	19.9	Yes	HQ>1
Mercury	16	0	ND (0.04)	nc	ND (0.04)	0.1	nd	No	BM>ND
Molybdenum	25	19	0.26	*0.7*	1.6	2	0.8	No	HQ<1
Nickel	25	25	9.3	*13.3*	21.7	30	0.7	No	HQ<1
Selenium	25	0	ND (0.17)	*nc*	ND (0.17)	1	nd	No	BM>ND
Silver	25	1	0.05	*nc*	0.17	2	0.1	No	HQ<1
Thallium	16	16	0.11	0.1	0.2	1	0.2	No	HQ<1
Uranium	16	16	2.74	7.0	15.3	5	3.1	Yes	HQ>1
Vanadium	25	25	20.3	*30.8*	49.6	2	24.8	Yes	HQ>1
Zinc	25	25	35.2	*51.1*	116	50	2.3	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-3. Identification of COPC in Surface Level Soil of Southwest Potentially Impacted Area (PIA)
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Aluminum	16	16	11,500	15,231	19,900	50	398	Yes	HQ>1
Antimony	16	14	0.6	0.7	1.2	5	0.2	No	HQ<1
Arsenic	16	16	2	3.8	5.5	10	0.6	No	HQ<1
Barium	16	16	109	170	220	500	0.4	No	HQ<1
Beryllium	16	16	0.56	0.6	0.7	10	0.1	No	HQ<1
Cadmium	16	16	0.07	0.2	0.36	3	0.1	No	HQ<1
Chromium	16	16	6.3	9.9	13.9	0.4	34.8	Yes	HQ>1
Cobalt	16	16	4.6	6.5	8.3	20	0.4	No	HQ<1
Copper	16	16	9.5	12.5	15.4	50	0.3	No	HQ<1
Iron	16	16	11,500	13,925	16,700	200	84	Yes	HQ>1
Lead	16	16	10.7	13.4	16.1	50	0.3	No	HQ<1
Magnesium	16	16	1,960	2,403	3,150	nb	nb	Yes	nb
Manganese	16	16	458	544	623	100	6.2	Yes	HQ>1
Mercury	16	0	ND (0.04)	nc	ND (0.04)	0.1	nd	No	BM>ND
Molybdenum	16	12	0.76	0.9	1.8	2	0.9	No	HQ<1
Nickel	16	16	6.1	8.9	12.3	30	0.4	No	HQ<1
Selenium	16	2	0.51	0.2	0.76	1	0.8	No	HQ<1
Silver	16	0	ND (0.07)	nc	ND (0.07)	2	nd	No	BM>ND
Thallium	16	16	0.11	0.1	0.17	1	0.2	No	HQ<1
Uranium	16	16	3.16	6.2	15.5	5	3.1	Yes	HQ>1
Vanadium	16	16	17.1	21.9	27.9	2	14.0	Yes	HQ>1
Zinc	16	16	32.9	42.1	58.1	50	1.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-4. Identification of COPC in Surface Level Soil of East Haul Road
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Aluminum	16	16	11,000	15,269	20,500	50	410	Yes	HQ>1
Antimony	16	12	0.59	0.6	1.1	5	0.2	No	HQ<1
Arsenic	16	16	2.7	16.4	92.4	10	9.2	Yes	HQ>1
Barium	16	16	50.2	126	177	500	0.4	No	HQ<1
Beryllium	16	16	0.57	0.8	1	10	0.1	No	HQ<1
Cadmium	16	12	0.13	0.4	0.86	3	0.3	No	HQ<1
Chromium	16	16	5.2	12.8	21.2	0.4	53	Yes	HQ>1
Cobalt	16	16	4.6	8.8	19.4	20	1.0	Yes	HQ=1
Copper	16	16	8.6	20.1	58.4	50	1.2	Yes	HQ>1
Iron	16	16	13,400	18,531	36,800	200	184	Yes	HQ>1
Lead	16	16	8.8	13.7	28.9	50	0.6	No	HQ<1
Magnesium	16	16	2,370	5,815	12,600	nb	nb	Yes	nb
Manganese	16	16	494	745	1160	100	11.6	Yes	HQ>1
Mercury	12	2	0.07	0.04	0.1	0.1	1.0	Yes	HQ=1
Molybdenum	16	16	0.41	2.0	5	2	2.5	Yes	HQ>1
Nickel	16	16	5.3	12.6	28.6	30	1.0	Yes	HQ=1
Selenium	16	0	ND (0.19)	nc	ND (0.19)	1	nd	No	BM>ND
Silver	16	1	ND (0.05)	nc	0.64	2	0.3	No	HQ<1
Thallium	12	12	0.13	0.2	0.25	1	0.3	No	HQ<1
Uranium	12	12	6.98	32.0	88.6	5	17.7	Yes	HQ>1
Vanadium	16	16	16.2	25.7	40.9	2	20.5	Yes	HQ>1
Zinc	16	16	39.4	52.4	90.3	50	1.8	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-5. Identification of COPC in Surface Level Soil of West Haul Road
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Aluminum	5	5	10,900	12,940	15,200	50	304	Yes	HQ>1
Antimony	5	1	ND (0.54)	0.4	0.86	5	0.2	No	HQ<1
Arsenic	5	5	2.8	11.7	30	10	3.0	Yes	HQ>1
Barium	5	5	64.9	125	160	500	0.3	No	HQ<1
Beryllium	5	5	0.6	0.8	1	10	0.1	No	HQ<1
Cadmium	5	4	0.09	0.3	0.72	3	0.2	No	HQ<1
Chromium	5	5	7.7	10.4	14	0.4	35	Yes	HQ>1
Cobalt	5	5	5.3	6.4	7.4	20	0.4	No	HQ<1
Copper	5	5	8.8	21.1	52.2	50	1.0	Yes	HQ=1
Iron	5	5	14,500	15,500	16,500	200	83	Yes	HQ>1
Lead	5	5	11.6	14.2	16.3	50	0.3	No	HQ<1
Magnesium	5	5	2,610	5,692	10,200	nb	nb	Yes	nb
Manganese	5	5	542	749	1100	100	11.0	Yes	HQ>1
Mercury	4	0	ND (0.04)	nc	ND (0.04)	0.1	nd	No	BM>ND
Molybdenum	5	5	0.67	2.7	7.4	2	3.7	Yes	HQ>1
Nickel	5	5	7	8.9	11.8	30	0.4	No	HQ<1
Selenium	5	0	ND (0.17)	nc	ND (0.17)	1	nd	No	BM>ND
Silver	5	0	ND (0.05)	nc	ND (0.05)	2	nd	No	BM>ND
Thallium	4	4	0.1	0.2	0.49	1	0.5	No	HQ<1
Uranium	4	4	7.2	93.7	262	5	52	Yes	HQ>1
Vanadium	5	5	16.3	23.3	28.3	2	14.2	Yes	HQ>1
Zinc	5	5	40.1	55.4	80.9	50	1.6	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ ≥1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-6. Identification of COPC in Surface Level Soil of Background
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[5] (HQ)	Retained as COPC?	Rationale
Aluminum	54	54	8,230	*15,300*	24,100	50	482	Yes	HQ>1
Antimony	41	15	0.54	*0.5*	1.4	5	0.3	No	HQ<1
Arsenic	54	40	0.73	*2.9*	234	10	23.4	Yes	HQ>1
Barium	54	54	82.1	*200*	384	500	0.8	No	HQ<1
Beryllium	54	53	0.33	*0.7*	1.7	10	0.2	No	HQ<1
Cadmium	54	53	0.09	*0.2*	0.45	3	0.2	No	HQ<1
Chromium	54	54	3.2	*9.6*	18.2	0.4	46	Yes	HQ>1
Cobalt	54	54	2.8	*6.1*	23.8	20	1.2	Yes	HQ>1
Copper	54	51	4.6	*12.7*	41.8	50	0.8	No	HQ<1
Iron	54	54	8,600	*17,100*	32,600	200	163	Yes	HQ>1
Lead	54	53	6	*12.8*	30	50	0.6	No	HQ<1
Magnesium	41	41	1,280	*2,250*	3,910	nb	nb	Yes	nb
Manganese	54	54	254	*760*	1,640	100	16.4	Yes	HQ>1
Mercury	54	9	0.02	*0.03*	0.12	0.1	1.2	Yes	HQ>1
Molybdenum	40	35	0.13	*0.6*	3.4	2	1.7	Yes	HQ>1
Nickel	54	54	3	*9.0*	24	30	0.8	No	HQ<1
Selenium	54	6	0.31	*0.2*	42	1	42	Yes	HQ>1
Silver	54	13	0.07	*0.1*	0.26	2	0.1	No	HQ<1
Thallium	54	54	0.1	*0.2*	1.6	1	1.6	Yes	HQ>1
Uranium	41	41	2.32	*4.8*	45.7	5	9.1	Yes	HQ>1
Vanadium	41	41	13.2	*24.2*	41.8	2	20.9	Yes	HQ>1
Zinc	54	54	17.2	*45.4*	62.4	50	1.2	Yes	HQ>1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1 or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-7. Identification of COPC in Subsurface Soils for Northeast Potentially Impacted Area (PIA)
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum	10	9	0.29	9,820	22,100	50	442	Yes	HQ>1
Antimony	10	0	ND (0.1)	nc	ND (1.4)	5	nd	No	BM>ND
Arsenic	10	7	0.08	4.6	31.2	10	3.1	Yes	HQ>1
Barium	10	10	2.6	130	255	500	0.5	No	HQ<1
Beryllium	10	7	0.002	0.4	1.1	10	0.1	No	HQ<1
Cadmium	10	4	0.05	0.1	0.07	3	0.0	No	HQ<1
Chromium	10	9	0.03	9.6	24	0.4	60	Yes	HQ>1
Cobalt	10	10	0.14	7.5	14.8	20	0.7	No	HQ<1
Copper	10	10	2.4	11.6	23.1	50	0.5	No	HQ<1
Iron	10	10	72.6	10,610	21,700	200	109	Yes	HQ>1
Lead	10	10	0.87	5.9	10.9	50	0.2	No	HQ<1
Magnesium	10	10	71.9	3,228	8,360	nb	nb	Yes	nb
Manganese	10	10	21	484	1,270	100	12.7	Yes	HQ>1
Molybdenum	10	8	0.06	0.3	0.93	2	0.5	No	HQ<1
Nickel	10	10	1.1	8.4	13.9	30	0.5	No	HQ<1
Selenium	10	0	ND (0.05)	nc	ND (0.05)	1	nd	No	BM>ND
Silver	10	0	ND (0.02)	nc	ND (0.02)	2	nd	No	BM>ND
Thallium	10	6	0.13	0.1	0.16	1	0.2	No	HQ<1
Uranium	10	10	0.56	3.0	10.1	5	2.0	Yes	HQ>1
Vanadium	10	10	0.15	18.4	35.2	2	17.6	Yes	HQ>1
Zinc	10	10	0.98	21.0	40.1	50	0.8	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-8. Identification of COPC in Subsurface Soils for Southwest Potentially Impacted Area (PIA)
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum	10	7	0.19	8,090	15,000	50	300	Yes	HQ>1
Antimony	10	0	ND (0.11)	nc	ND (0.11)	5	nd	No	BM>ND
Arsenic	10	9	0.07	2.0	4.6	10	0.5	No	HQ<1
Barium	10	10	3	105	217	500	0.4	No	HQ<1
Beryllium	10	6	0.56	0.4	0.66	10	0.1	No	HQ<1
Cadmium	10	4	0.04	0.04	0.05	3	0.0	No	HQ<1
Chromium	10	10	0.02	4.7	10.2	0.4	25.5	Yes	HQ>1
Cobalt	10	10	0.08	4.4	8.6	20	0.4	No	HQ<1
Copper	10	10	2.5	8.9	16.1	50	0.3	No	HQ<1
Iron	10	10	46.2	8,261	15,100	200	76	Yes	HQ>1
Lead	10	10	1.1	7.1	12.5	50	0.3	No	HQ<1
Magnesium	10	10	94	1,578	2,780	nb	nb	Yes	nb
Manganese	10	10	10.4	336	652	100	6.5	Yes	HQ>1
Molybdenum	10	8	0.05	0.4	1.1	2	0.6	No	HQ<1
Nickel	10	10	0.83	5.9	10.7	30	0.4	No	HQ<1
Selenium	10	0	ND (0.05)	nc	ND (0.05)	1	nd	No	BM>ND
Silver	10	0	ND (0.02)	nc	ND (0.02)	2	nd	No	BM>ND
Thallium	10	6	0.11	0.1	0.14	1	0.1	No	HQ<1
Uranium	10	10	0.5	2.8	6.71	5	1.3	Yes	HQ>1
Vanadium	10	10	0.2	13.1	24.4	2	12.2	Yes	HQ>1
Zinc	10	10	0.8	22.4	38.1	50	0.8	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-9. Identification of COPC in Subsurface Soils for East Haul Road
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum	8	6	0.28	8,813	17,200	50	344	Yes	HQ>1
Antimony	8	1	ND (0.1)	0.4	1.2	5	0.2	No	HQ<1
Arsenic	8	5	1.7	9.6	64.2	10	6.4	Yes	HQ>1
Barium	8	8	0.77	102	212	500	0.4	No	HQ<1
Beryllium	8	5	0.6	0.5	0.98	10	0.1	No	HQ<1
Cadmium	8	3	0.02	0.1	0.07	3	0.02	No	HQ<1
Chromium	8	7	0.02	6.6	18.8	0.4	47	Yes	HQ>1
Cobalt	8	8	0.07	4.4	10.5	20	0.5	No	HQ<1
Copper	8	8	1.4	11.0	30.6	50	0.6	No	HQ<1
Iron	8	8	51.3	11,124	30,300	200	152	Yes	HQ>1
Lead	8	8	0.72	7.2	13.1	50	0.3	No	HQ<1
Magnesium	8	8	67.8	2,510	6,600	nb	nb	Yes	nb
Manganese	8	8	22.5	354	652	100	6.5	Yes	HQ>1
Molybdenum	8	8	0.04	1.0	4.4	2	2.2	Yes	HQ>1
Nickel	8	8	0.33	6.2	15.4	30	0.5	No	HQ<1
Selenium	8	3	0.06	0.2	0.56	1	0.6	No	HQ<1
Silver	8	0	ND (0.02)	nc	ND (0.02)	2	nd	No	BM>ND
Thallium	8	5	0.12	0.1	0.22	1	0.2	No	HQ<1
Uranium	8	8	0.52	16.7	47.8	5	9.6	Yes	HQ>1
Vanadium	8	8	0.1	15.6	34.5	2	17.3	Yes	HQ>1
Zinc	8	8	0.59	24.6	47.6	50	1.0	Yes	HQ=1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-10. Identification of COPC in Subsurface Soils for- West Haul Road
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Maximum Detection[2] (mg/kg)	Benchmark Value (BM)[3] (mg/kg)	Hazard Quotient[4] (HQ)	Retained as COPC?	Rationale
Aluminum	1	1	9,990	50	200	Yes	HQ>1
Antimony	1	0	ND (0.72)	5.0	nd	No	BM>ND
Arsenic	1	1	1.9	10	0.2	No	HQ<1
Barium	1	1	120	500	0.2	No	HQ<1
Beryllium	1	1	0.61	10	0.1	No	HQ<1
Cadmium	1	0	ND (0.04)	3.0	nd	No	BM>ND
Chromium	1	1	6	0.4	15.0	Yes	HQ>1
Cobalt	1	1	5	20	0.3	No	HQ<1
Copper	1	1	7.6	50	0.2	No	HQ<1
Iron	1	1	12,100	200	61	Yes	HQ>1
Lead	1	1	14.2	50	0.3	No	HQ<1
Magnesium	1	1	2,460	nb	nb	Yes	nb
Manganese	1	1	469	100	4.7	Yes	HQ>1
Molybdenum	1	1	0.46	2	0.2	No	HQ<1
Nickel	1	0	ND (6.2)	30.0	nd	No	BM>ND
Selenium	1	0	ND (0.42)	1.0	nd	No	BM>ND
Silver	1	0	ND (0.16)	2.0	nd	No	BM>ND
Thallium	1	1	0.1	1	0.1	No	HQ<1
Uranium	1	1	7.27	5	1.5	Yes	HQ>1
Vanadium	1	1	18.4	2	9.2	Yes	HQ>1
Zinc	1	1	36.3	50	0.7	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. See Section 2.3 for origin of benchmark values.
4. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Table G-11. Identification of COPC in Subsurface Soils for Background
Midnite Mine Site
Wellpinit, WA

Analyte[1]	Number of Samples	Number of Detects	Minimum Detection[2] (mg/kg)	Central Tendency[3] (mg/kg)	Maximum Detection[4] (mg/kg)	Benchmark Value (BM)[5] (mg/kg)	Hazard Quotient[6] (HQ)	Retained as COPC?	Rationale
Aluminum	26	25	0.88	*10,750*	16,500	50	330	Yes	HQ>1
Antimony	26	14	0.69	*0.8*	1.2	5	0.2	No	HQ<1
Arsenic	26	21	0.14	*1.1*	86.1	10	8.6	Yes	HQ>1
Barium	26	26	1.9	*170*	349	500	0.7	No	HQ<1
Beryllium	26	19	0.002	*0.4*	1.4	10	0.1	No	HQ<1
Cadmium	26	10	0.02	*0.1*	0.1	3	0.03	No	HQ<1
Chromium	26	21	0.02	*4.5*	14.9	0.4	37	Yes	HQ>1
Cobalt	26	26	0.05	*4.5*	21.3	20	1.1	Yes	HQ>1
Copper	26	26	0.8	*6.7*	35.8	50	0.7	No	HQ<1
Iron	26	26	83.5	*11,050*	28,600	200	143	Yes	HQ>1
Lead	26	26	0.74	*9.1*	12.3	50	0.2	No	HQ<1
Magnesium	26	26	36.2	*1,740*	2,780	nb	nb	Yes	nb
Manganese	26	26	13.8	*655*	1,300	100	13.0	Yes	HQ>1
Molybdenum	26	19	0.03	*0.2*	2.4	2	1.2	Yes	HQ>1
Nickel	26	26	0.36	*5.7*	15.1	30	0.5	No	HQ<1
Selenium	26	9	0.05	*0.2*	0.56	1	0.6	No	HQ<1
Silver	26	0	ND (0.02)	nc	ND (0.02)	2	nd	No	BM>ND
Thallium	26	16	0.1	*0.1*	0.2	1	0.2	No	HQ<1
Uranium	26	26	0.33	*3.2*	43.3	5	8.7	Yes	HQ>1
Vanadium	26	26	0.07	*16.0*	34.9	2	17.5	Yes	HQ>1
Zinc	26	26	0.77	*30.4*	44.9	50	0.9	No	HQ<1

1. Analytes listed based on results from E&E(1998), SMI(1999), and URS(2000).
2. Minimum Detection reported as minimum detection or, if all values are non-detects, reported as ND (LSDL).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detects. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B for statistical methods)
4. Maximum Detection reported as maximum detection or, if all values are non-detects, reported as ND (LSDL).
5. See Section 2.3 for origin of benchmark values.
6. HQ based on maximum detection value divided by BM.

ND = not detected (LSDL); LSDL = Lowest Sample Detection Limit
BM = benchmark value; HQ = Hazard Quotient; nd = not determined; nb = no benchmark
shaded rows = HQ $\geq$1, BM < ND, or nb
COPC = Contaminants of Potential Concern
mg/kg = milligrams per kilogram

Appendix H - Total Ionizing Radiation Screening Tables
Midnite Mine Site
Wellpinit, Washington

Table H-1. Total Ionizing Radiation in Surface Water and Composite Sediment for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	3	2	0.447	8.73E+00	0.0512	0.0512	Radium 226	1	1	6.91	1.14E+04	0.0006	0.0006
Radium 228	3	0	2	9.34E+00	0.2141	0.2141	Radium 228	1	1	1.68	1.07E+04	0.0002	0.0002
Thorium 232	3	0	0.3	3.32E+02	0.0009	0.0009	Thorium 232	1	1	0.949	1.07E+04	0.0001	0.0001
Uranium 234	3	3	92.3	2.02E+02	0.4569	0.4569	Uranium 234	1	1	11.9	2.94E+06	0.0000	0.0000
Uranium 235	3	3	3.64	2.21E+02	0.0165	0.0165	Uranium 235	1	1	0.74	1.03E+05	0.0000	0.0000
Uranium 238	3	3	85.1	2.27E+02	0.3749	0.3749	Uranium 238	1	1	10.6	4.28E+04	0.0002	0.0002
Sum-of-the-Fractions					1.1145		**Sum-of-the-Fractions**					0.0011	
Total Ionizing Radiation in Water (rad/day)						1.1145	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0011

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **1.1**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-2. Total Ionizing Radiation in Surface Water and Composite Sediment for Western Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Composite Sediment						
Radium 226	18	18	2.52	8.73E+00	0.2887	0.2887	Radium 226	3	3	8.31	1.14E+04	0.0007	0.0007
Radium 228	16	13	2.81	9.34E+00	0.3009	0.3009	Radium 228	3	3	5.65	1.07E+04	0.0005	0.0005
Thorium 232	3	2	0.225	3.32E+02	0.0007	0.0007	Thorium 232	3	3	4.63	1.07E+04	0.0004	0.0004
Uranium 234	17	16	38.1	2.02E+02	0.1886	0.1886	Uranium 234	3	3	66.2	2.94E+06	0.0000	0.0000
Uranium 235	15	14	18	2.21E+02	0.0814	0.0814	Uranium 235	3	3	3.83	1.03E+05	0.0000	0.0000
Uranium 238	17	16	34.4	2.27E+02	0.1515	0.1515	Uranium 238	3	3	61.5	4.28E+04	0.0014	0.0014
Sum-of-the-Fractions					1.0118		**Sum-of-the-Fractions**					0.0032	
Total Ionizing Radiation in Water (rad/day)						1.0118	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0032

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **1.0**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-3. Total Ionizing Radiation in Surface Water and Composite Sediment for Northeastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	1	1	13.4	8.73E+00	1.5349	1.5349	Radium 226	2	2	62.1	1.14E+04	0.0054	0.0054
Radium 228	1	1	1.43	9.34E+00	0.1531	0.1531	Radium 228	2	2	2.61	1.07E+04	0.0002	0.0002
Thorium 232	1	1	10.5	3.32E+02	0.0316	0.0316	Thorium 232	2	2	3.11	1.07E+04	0.0003	0.0003
Uranium 234	1	1	295	2.02E+02	1.4604	1.4604	Uranium 234	2	2	59.5	2.94E+06	0.0000	0.0000
Uranium 235	1	1	19	2.21E+02	0.0860	0.0860	Uranium 235	2	2	3.27	1.03E+05	0.0000	0.0000
Uranium 238	1	1	357	2.27E+02	1.5727	1.5727	Uranium 238	2	2	63.3	4.28E+04	0.0015	0.0015
Sum-of-the-Fractions					4.8387		**Sum-of-the-Fractions**					0.0075	
Total Ionizing Radiation in Water (rad/day)						4.8387	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0075

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **4.8**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-4. Total Ionizing Radiation in Surface Water and Composite Sediment for Central Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	18	18	1.75	8.73E+00	0.2005	0.2005	Radium 226	2	2	9.86	1.14E+04	0.0009	0.0009
Radium 228	16	12	3	9.34E+00	0.3212	0.3212	Radium 228	2	2	3.78	1.07E+04	0.0004	0.0004
Thorium 232	3	1	0.11	3.32E+02	0.0003	0.0003	Thorium 232	2	2	3.84	1.07E+04	0.0004	0.0004
Uranium 234	17	17	360	2.02E+02	1.7822	1.7822	Uranium 234	2	2	361	2.94E+06	0.0001	0.0001
Uranium 235	17	16	18	2.21E+02	0.0814	0.0814	Uranium 235	2	2	21.6	1.03E+05	0.0002	0.0002
Uranium 238	17	16	360	2.27E+02	1.5859	1.5859	Uranium 238	2	2	338	4.28E+04	0.0079	0.0079
Sum-of-the-Fractions					3.9715		**Sum-of-the-Fractions**					0.0098	
Total Ionizing Radiation in Water (rad/day)						3.9715	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0098

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **4.0**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-5. Total Ionizing Radiation in Surface Water and Composite Sediment for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	39	39	2.11	8.73E+00	0.2417	0.2417	Radium 226	6	6	16.1	1.14E+04	0.0014	0.0014
Radium 228	36	19	4.2	9.34E+00	0.4497	0.4497	Radium 228	6	5	4.88	1.07E+04	0.0005	0.0005
Thorium 232	16	6	0.134	3.32E+02	0.0004	0.0004	Thorium 232	6	6	3.08	1.07E+04	0.0003	0.0003
Uranium 234	37	36	64	2.02E+02	0.3168	0.3168	Uranium 234	6	6	22.6	2.94E+06	0.0000	0.0000
Uranium 235	35	33	22	2.21E+02	0.0995	0.0995	Uranium 235	6	6	1.59	1.03E+05	0.0000	0.0000
Uranium 238	37	37	58	2.27E+02	0.2555	0.2555	Uranium 238	6	6	19.2	4.28E+04	0.0004	0.0004
Sum-of-the-Fractions					1.3637		**Sum-of-the-Fractions**					0.0026	
Total Ionizing Radiation in Water (rad/day)						1.3637	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0026

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **1.4**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-6. Total Ionizing Radiation in Surface Water and Composite Sediment for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Composite Sediment**						
Radium 226	16	14	0.97	8.73E+00	0.1111	0.1111	Radium 226	1	1	20	1.14E+04	0.0018	0.0018
Radium 228	15	8	2.16	9.34E+00	0.2313	0.2313	Radium 228	1	1	9.39	1.07E+04	0.0009	0.0009
Thorium 232	6	3	0.0638	3.32E+02	0.0002	0.0002	Thorium 232	1	1	2.72	1.07E+04	0.0003	0.0003
Uranium 234	15	14	73	2.02E+02	0.3614	0.3614	Uranium 234	1	1	50	2.94E+06	0.0000	0.0000
Uranium 235	13	12	6.5	2.21E+02	0.0294	0.0294	Uranium 235	1	1	4.83	1.03E+05	0.0000	0.0000
Uranium 238	15	15	72	2.27E+02	0.3172	0.3172	Uranium 238	1	1	45.7	4.28E+04	0.0011	0.0011
Sum-of-the-Fractions					1.0505		**Sum-of-the-Fractions**					0.0040	
Total Ionizing Radiation in Water (rad/day)						1.0505	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0040

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **1.1**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-7. Total Ionizing Radiation in Surface Water and Composite Sediment for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Composite Sediment**						
Radium 226	15	14	1.3	8.73E+00	0.1489	0.1489	Radium 226	1	1	3.42	1.14E+04	0.0003	0.0003
Radium 228	13	10	5.16	9.34E+00	0.5525	0.5525	Radium 228	1	1	2.61	1.07E+04	0.0002	0.0002
Thorium 232	3	2	0.225	3.32E+02	0.0007	0.0007	Thorium 232	1	1	4.86	1.07E+04	0.0005	0.0005
Uranium 234	14	14	48	2.02E+02	0.2376	0.2376	Uranium 234	1	1	3.62	2.94E+06	0.0000	0.0000
Uranium 235	12	11	14	2.21E+02	0.0633	0.0633	Uranium 235	1	1	0.223	1.03E+05	0.0000	0.0000
Uranium 238	14	12	23	2.27E+02	0.1013	0.1013	Uranium 238	1	1	3.38	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					1.1043		**Sum-of-the-Fractions**					0.0011	
Total Ionizing Radiation in Water (rad/day)						1.1043	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0011

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **1.1**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-8. Total Ionizing Radiation in Surface Water and Composite Sediment for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	30	25	5.1	8.73E+00	0.5842	0.5842	Radium 226	2	2	7.25	1.14E+04	0.0006	0.0006
Radium 228	29	18	2	9.34E+00	0.2141	0.2141	Radium 228	2	2	6.77	1.07E+04	0.0006	0.0006
Thorium 232	9	3	0.234	3.32E+02	0.0007	0.0007	Thorium 232	2	2	3.85	1.07E+04	0.0004	0.0004
Uranium 234	29	28	46	2.02E+02	0.2277	0.2277	Uranium 234	2	2	4.73	2.94E+06	0.0000	0.0000
Uranium 235	26	23	9.4	2.21E+02	0.0425	0.0425	Uranium 235	2	2	0.23	1.03E+05	0.0000	0.0000
Uranium 238	29	29	32	2.27E+02	0.1410	0.1410	Uranium 238	2	2	4.53	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					1.2103		**Sum-of-the-Fractions**					0.0017	
Total Ionizing Radiation in Water (rad/day)						1.2103	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0017

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **1.2**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-9. Total Ionizing Radiation in Surface Water and Composite Sediment for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	9	5	0.471	8.73E+00	0.0540	0.0540	Radium 226	2	2	1.95	1.14E+04	0.0002	0.0002
Radium 228	9	5	3	9.34E+00	0.3212	0.3212	Radium 228	2	2	1.61	1.07E+04	0.0002	0.0002
Thorium 232	9	3	0.231	3.32E+02	0.0007	0.0007	Thorium 232	2	2	1.73	1.07E+04	0.0002	0.0002
Uranium 234	9	9	9.7	2.02E+02	0.0480	0.0480	Uranium 234	2	2	2.84	2.94E+06	0.0000	0.0000
Uranium 235	9	6	0.724	2.21E+02	0.0033	0.0033	Uranium 235	2	1	0.147	1.03E+05	0.0000	0.0000
Uranium 238	9	9	8.81	2.27E+02	0.0388	0.0388	Uranium 238	2	2	2.66	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.4660		**Sum-of-the-Fractions**					0.0005	
Total Ionizing Radiation in Water (rad/day)						0.4660	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0005

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.5**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-10. Total Ionizing Radiation in Surface Water and Composite Sediment for Franklin D. Roosevelt Lake
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	1	0	1	8.73E+00	0.1145	0.1145	Radium 226	1	1	1.41	1.14E+04	0.0001	0.0001
Radium 228	1	0	1.6	9.34E+00	0.1713	0.1713	Radium 228	1	1	1.67	1.07E+04	0.0002	0.0002
Thorium 232	1	0	0.5	3.32E+02	0.0015	0.0015	Thorium 232	1	1	1.01	1.07E+04	0.0001	0.0001
Uranium 234	1	0	0.3	2.02E+02	0.0015	0.0015	Uranium 234	1	1	0.685	2.94E+06	0.0000	0.0000
Uranium 235	1	0	0.2	2.21E+02	0.0009	0.0009	Uranium 235	1	1	0.052	1.03E+05	0.0000	0.0000
Uranium 238	1	0	0.2	2.27E+02	0.0009	0.0009	Uranium 238	1	1	0.632	4.28E+04	0.0000	0.0000
Sum-of-the-Fractions					0.2906		**Sum-of-the-Fractions**					0.0004	
Total Ionizing Radiation in Water (rad/day)						0.2906	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0004

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.3**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-11. Total Ionizing Radiation in Surface Water and Composite Sediment for Background
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Composite Sediment**						
Radium 226	40	40	4.36	8.73E+00	0.4994	0.4994	Radium 226	22	22	12.4	1.14E+04	0.0011	0.0011
Radium 228	40	13	1.99	9.34E+00	0.2131	0.2131	Radium 228	22	22	3.92	1.07E+04	0.0004	0.0004
Thorium 232	38	26	2.18	3.32E+02	0.0066	0.0066	Thorium 232	22	22	13.1	1.07E+04	0.0012	0.0012
Uranium 234	59	57	7.04	2.02E+02	0.0349	0.0349	Uranium 234	22	22	25.4	2.94E+06	0.0000	0.0000
Uranium 235	59	37	1.73	2.21E+02	0.0078	0.0078	Uranium 235	22	20	1.53	1.03E+05	0.0000	0.0000
Uranium 238	59	56	5.48	2.27E+02	0.0241	0.0241	Uranium 238	22	22	22	4.28E+04	0.0005	0.0005
Sum-of-the-Fractions					0.7859		**Sum-of-the-Fractions**					0.0032	
Total Ionizing Radiation in Water (rad/day)						0.7859	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0032

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.8**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-12. Total Ionizing Radiation in Surface Waterand Grab Sediment for Pit 3
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	14	14	71.3	8.73E+00	8.1672	8.1672	Radium 226	2	0	1.98	1.14E+04	0.0002	0.0002
Radium 228	14	12	7	9.34E+00	0.7495	0.7495	Radium 228	2	2	4.9	1.07E+04	0.0005	0.0005
Thorium 232	4	3	47.2	3.32E+02	0.1422	0.1422	Thorium 232	2	0	4.69	1.07E+04	0.0004	0.0004
Uranium 234	14	14	8100	2.02E+02	40.0990	40.0990	Uranium 234	2	2	284.9	2.94E+06	0.0001	0.0001
Uranium 235	14	13	895	2.21E+02	4.0498	4.0498	Uranium 235	2	2	7.9	1.03E+05	0.0001	0.0001
Uranium 238	14	14	8000	2.27E+02	35.2423	35.2423	Uranium 238	2	2	305	4.28E+04	0.0071	0.0071
Sum-of-the-Fractions					88.4499		**Sum-of-the-Fractions**					0.0084	
Total Ionizing Radiation in Water (rad/day)						88.4499	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0084

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **88.5**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-13. Total Ionizing Radiation in Surface Water and Grab Sediment for Pit 4
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	13	13	8.76	8.73E+00	1.0034	1.0034	Radium 226	3	3	38.05	1.14E+04	0.0033	0.0033
Radium 228	11	6	2	9.34E+00	0.2141	0.2141	Radium 228	3	3	5.89	1.07E+04	0.0006	0.0006
Thorium 232	3	2	3.8	3.32E+02	0.0114	0.0114	Thorium 232	3	1	1.45	1.07E+04	0.0001	0.0001
Uranium 234	12	12	1400	2.02E+02	6.9307	6.9307	Uranium 234	3	3	312	2.94E+06	0.0001	0.0001
Uranium 235	12	12	66	2.21E+02	0.2986	0.2986	Uranium 235	3	3	14.8	1.03E+05	0.0001	0.0001
Uranium 238	12	12	1100	2.27E+02	4.8458	4.8458	Uranium 238	3	3	236.8	4.28E+04	0.0055	0.0055
Sum-of-the-Fractions					13.3042		**Sum-of-the-Fractions**					0.0098	
Total Ionizing Radiation in Water (rad/day)						13.3042	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0098

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **13.3**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-14. Total Ionizing Radiation in Surface Water and Grab Sediment for Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)**[2]	**Partial Fraction**	**Rad/day**	**Radionuclide**[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)**[2]	**Partial Fraction**	**Rad/day**
Surface Water							**Grab Sediment**						
Radium 226	20	20	49.4	8.73E+00	5.6586	5.6586	Radium 226	2	1	5.919	1.14E+04	0.0005	0.0005
Radium 228	19	17	14.53	9.34E+00	1.5557	1.5557	Radium 228	2	2	16.94	1.07E+04	0.0016	0.0016
Thorium 232	3	3	112	3.32E+02	0.3373	0.3373	Thorium 232	2	2	47.2	1.07E+04	0.0044	0.0044
Uranium 234	19	19	11000	2.02E+02	54.4554	54.4554	Uranium 234	2	2	2408	2.94E+06	0.0008	0.0008
Uranium 235	19	18	470	2.21E+02	2.1267	2.1267	Uranium 235	2	2	115.2	1.03E+05	0.0011	0.0011
Uranium 238	19	19	11000	2.27E+02	48.4581	48.4581	Uranium 238	2	2	2336	4.28E+04	0.0546	0.0546
Sum-of-the-Fractions					112.5920		**Sum-of-the-Fractions**					0.0630	
Total Ionizing Radiation in Water (rad/day)						112.5920	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0630

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **112.7**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-15. Total Ionizing Radiation in Surface Water and Grab Sediment for Blood Pool
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	7	7	7.3	8.73E+00	0.8362	0.8362	Radium 226	2	1	35.2	1.14E+04	0.0031	0.0031
Radium 228	6	6	3.6	9.34E+00	0.3854	0.3854	Radium 228	2	2	5.42	1.07E+04	0.0005	0.0005
Thorium 232	2	0	2.2	3.32E+02	0.0066	0.0066	Thorium 232	2	2	1.9	1.07E+04	0.0002	0.0002
Uranium 234	7	7	2386	2.02E+02	11.8119	11.8119	Uranium 234	2	2	42.5	2.94E+06	0.0000	0.0000
Uranium 235	7	7	440	2.21E+02	1.9910	1.9910	Uranium 235	2	0	0.921	1.03E+05	0.0000	0.0000
Uranium 238	7	7	2670	2.27E+02	11.7621	11.7621	Uranium 238	2	2	32.1	4.28E+04	0.0008	0.0008
Sum-of-the-Fractions					26.7932		**Sum-of-the-Fractions**					0.0045	
Total Ionizing Radiation in Water (rad/day)						26.7932	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0045

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **26.8**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-16. Total Ionizing Radiation in Surface Water and Grab Sediment for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	3	2	0.447	8.73E+00	0.0512	0.0512	Radium 226	1	0	1.63	1.14E+04	0.0001	0.0001
Radium 228	3	0	2	9.34E+00	0.2141	0.2141	Radium 228	1	1	5.1	1.07E+04	0.0005	0.0005
Thorium 232	3	0	0.3	3.32E+02	0.0009	0.0009	Thorium 232	1	1	4.52	1.07E+04	0.0004	0.0004
Uranium 234	3	3	92.3	2.02E+02	0.4569	0.4569	Uranium 234	1	1	126.1	2.94E+06	0.0000	0.0000
Uranium 235	3	3	3.64	2.21E+02	0.0165	0.0165	Uranium 235	1	1	5.41	1.03E+05	0.0001	0.0001
Uranium 238	3	3	85.1	2.27E+02	0.3749	0.3749	Uranium 238	1	1	136.6	4.28E+04	0.0032	0.0032
Sum-of-the-Fractions					1.1145		**Sum-of-the-Fractions**					0.0043	
Total Ionizing Radiation in Water (rad/day)						1.1145	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0043

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **1.1**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-17. Total Ionizing Radiation in Surface Water and Grab Sediment for Western Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	18	18	2.52	8.73E+00	0.2887	0.2887	Radium 226	3	1	3.001	1.14E+04	0.0003	0.0003
Radium 228	16	13	2.81	9.34E+00	0.3009	0.3009	Radium 228	3	3	2.939	1.07E+04	0.0003	0.0003
Thorium 232	3	2	0.225	3.32E+02	0.0007	0.0007	Thorium 232	3	3	2.2	1.07E+04	0.0002	0.0002
Uranium 234	17	16	38.1	2.02E+02	0.1886	0.1886	Uranium 234	9	9	110	2.94E+06	0.0000	0.0000
Uranium 235	15	14	18	2.21E+02	0.0814	0.0814	Uranium 235	9	8	4.3	1.03E+05	0.0000	0.0000
Uranium 238	17	16	34.4	2.27E+02	0.1515	0.1515	Uranium 238	9	9	110	4.28E+04	0.0026	0.0026
Sum-of-the-Fractions					1.0118		**Sum-of-the-Fractions**					0.0034	
Total Ionizing Radiation in Water (rad/day)						1.0118	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0034

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **1.0**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-18. Total Ionizing Radiation in Surface Water and Grab Sediment for Central Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	18	18	1.75	8.73E+00	0.2005	0.2005	Radium 226	2	0	1.08	1.14E+04	0.0001	0.0001
Radium 228	16	12	3	9.34E+00	0.3212	0.3212	Radium 228	2	2	6.02	1.07E+04	0.0006	0.0006
Thorium 232	3	1	0.11	3.32E+02	0.0003	0.0003	Thorium 232	2	1	1.43	1.07E+04	0.0001	0.0001
Uranium 234	17	17	360	2.02E+02	1.7822	1.7822	Uranium 234	2	2	1064	2.94E+06	0.0004	0.0004
Uranium 235	17	16	18	2.21E+02	0.0814	0.0814	Uranium 235	2	2	21.2	1.03E+05	0.0002	0.0002
Uranium 238	17	16	360	2.27E+02	1.5859	1.5859	Uranium 238	2	2	1106	4.28E+04	0.0258	0.0258
Sum-of-the-Fractions					3.9715		**Sum-of-the-Fractions**					0.0272	
Total Ionizing Radiation in Water (rad/day)						3.9715	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0272

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **4.0**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-19. Total Ionizing Radiation in Surface Water and Grab Sediment for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	39	39	2.11	8.73E+00	0.2417	0.2417	Radium 226	3	1	3.379	1.14E+04	0.0003	0.0003
Radium 228	36	19	4.2	9.34E+00	0.4497	0.4497	Radium 228	3	3	4.85	1.07E+04	0.0005	0.0005
Thorium 232	16	6	0.134	3.32E+02	0.0004	0.0004	Thorium 232	3	2	4.42	1.07E+04	0.0004	0.0004
Uranium 234	37	36	64	2.02E+02	0.3168	0.3168	Uranium 234	7	7	19.91	2.94E+06	0.0000	0.0000
Uranium 235	35	33	22	2.21E+02	0.0995	0.0995	Uranium 235	7	7	1.368	1.03E+05	0.0000	0.0000
Uranium 238	37	37	58	2.27E+02	0.2555	0.2555	Uranium 238	7	7	19.67	4.28E+04	0.0005	0.0005
Sum-of-the-Fractions					1.3637		**Sum-of-the-Fractions**					0.0016	
Total Ionizing Radiation in Water (rad/day)						1.3637	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0016

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **1.4**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-20. Total Ionizing Radiation in Surface Water and Grab Sediment for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	16	14	0.97	8.73E+00	0.1111	0.1111	Radium 226	2	1	7.42	1.14E+04	0.0007	0.0007
Radium 228	15	8	2.16	9.34E+00	0.2313	0.2313	Radium 228	2	2	5.8	1.07E+04	0.0005	0.0005
Thorium 232	6	3	0.0638	3.32E+02	0.0002	0.0002	Thorium 232	2	2	2.24	1.07E+04	0.0002	0.0002
Uranium 234	15	14	73	2.02E+02	0.3614	0.3614	Uranium 234	4	4	25.71	2.94E+06	0.0000	0.0000
Uranium 235	13	12	6.5	2.21E+02	0.0294	0.0294	Uranium 235	4	4	1.4	1.03E+05	0.0000	0.0000
Uranium 238	15	15	72	2.27E+02	0.3172	0.3172	Uranium 238	4	4	29.68	4.28E+04	0.0007	0.0007
Sum-of-the-Fractions					1.0505		**Sum-of-the-Fractions**					0.0021	
Total Ionizing Radiation in Water (rad/day)						1.0505	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0021

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **1.1**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-21. Total Ionizing Radiation in Surface Water and Grab Sediment for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	15	14	1.3	8.73E+00	0.1489	0.1489	Radium 226	1	1	2.692	1.14E+04	0.0002	0.0002
Radium 228	13	10	5.16	9.34E+00	0.5525	0.5525	Radium 228	1	1	4.419	1.07E+04	0.0004	0.0004
Thorium 232	3	2	0.225	3.32E+02	0.0007	0.0007	Thorium 232	1	1	2.049	1.07E+04	0.0002	0.0002
Uranium 234	14	14	48	2.02E+02	0.2376	0.2376	Uranium 234	10	10	6.5	2.94E+06	0.0000	0.0000
Uranium 235	12	11	14	2.21E+02	0.0633	0.0633	Uranium 235	10	10	1.3	1.03E+05	0.0000	0.0000
Uranium 238	14	12	23	2.27E+02	0.1013	0.1013	Uranium 238	10	10	6.3	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					1.1043		**Sum-of-the-Fractions**					0.0010	
Total Ionizing Radiation in Water (rad/day)						1.1043	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0010

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **1.1**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-22. Total Ionizing Radiation in Surface Water and Grab Sediment for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	30	25	5.1	8.73E+00	0.5842	0.5842	Radium 226	5	2	2.937	1.14E+04	0.0003	0.0003
Radium 228	29	18	2	9.34E+00	0.2141	0.2141	Radium 228	5	5	5.356	1.07E+04	0.0005	0.0005
Thorium 232	9	3	0.234	3.32E+02	0.0007	0.0007	Thorium 232	5	5	2.024	1.07E+04	0.0002	0.0002
Uranium 234	29	28	46	2.02E+02	0.2277	0.2277	Uranium 234	17	17	31	2.94E+06	0.0000	0.0000
Uranium 235	26	23	9.4	2.21E+02	0.0425	0.0425	Uranium 235	17	16	1.2	1.03E+05	0.0000	0.0000
Uranium 238	29	29	32	2.27E+02	0.1410	0.1410	Uranium 238	17	17	30	4.28E+04	0.0007	0.0007
Sum-of-the-Fractions					1.2103		**Sum-of-the-Fractions**					0.0017	
Total Ionizing Radiation in Water (rad/day)						1.2103	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0017

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **1.2**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-23. Total Ionizing Radiation in Surface Water and Grab Sediment for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	9	5	0.471	8.73E+00	0.0540	0.0540	Radium 226	4	0	3.33	1.14E+04	0.0003	0.0003
Radium 228	9	5	3	9.34E+00	0.3212	0.3212	Radium 228	4	4	5.15	1.07E+04	0.0005	0.0005
Thorium 232	9	3	0.231	3.32E+02	0.0007	0.0007	Thorium 232	4	4	2.5	1.07E+04	0.0002	0.0002
Uranium 234	9	9	9.7	2.02E+02	0.0480	0.0480	Uranium 234	4	2	9.91	2.94E+06	0.0000	0.0000
Uranium 235	9	6	0.724	2.21E+02	0.0033	0.0033	Uranium 235	4	2	0.438	1.03E+05	0.0000	0.0000
Uranium 238	9	9	8.81	2.27E+02	0.0388	0.0388	Uranium 238	4	2	8.26	4.28E+04	0.0002	0.0002
Sum-of-the-Fractions					0.4660		**Sum-of-the-Fractions**					0.0012	
Total Ionizing Radiation in Water (rad/day)						0.4660	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0012

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.5**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-24. Total Ionizing Radiation in Surface Water and Grab Sediment for Franklin D. Roosevelt Lake
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	1	0	1	8.73E+00	0.1145	0.1145	Radium 226	1	1	1.738	1.14E+04	0.0002	0.0002
Radium 228	1	0	1.6	9.34E+00	0.1713	0.1713	Radium 228	1	1	1.649	1.07E+04	0.0002	0.0002
Thorium 232	1	0	0.5	3.32E+02	0.0015	0.0015	Thorium 232	1	1	0.592	1.07E+04	0.0001	0.0001
Uranium 234	1	0	0.3	2.02E+02	0.0015	0.0015	Uranium 234	1	0	59.5	2.94E+06	0.0000	0.0000
Uranium 235	1	0	0.2	2.21E+02	0.0009	0.0009	Uranium 235	1	0	3.27	1.03E+05	0.0000	0.0000
Uranium 238	1	0	0.2	2.27E+02	0.0009	0.0009	Uranium 238	1	0	63.3	4.28E+04	0.0015	0.0015
Sum-of-the-Fractions					0.2906		**Sum-of-the-Fractions**					0.0019	
Total Ionizing Radiation in Water (rad/day)						0.2906	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0019

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.3**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Maximum detected result for nondetected radionuclides reported as detection limit.

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-25. Total Ionizing Radiation in Surface Water and Grab Sediment for Background
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	40	40	4.36	8.73E+00	0.4994	0.4994	Radium 226	21	21	8.47	1.14E+04	0.0007	0.0007
Radium 228	40	13	1.99	9.34E+00	0.2131	0.2131	Radium 228	22	22	9.57	1.07E+04	0.0009	0.0009
Thorium 232	38	26	2.18	3.32E+02	0.0066	0.0066	Thorium 232	22	22	5	1.07E+04	0.0005	0.0005
Uranium 234	59	57	7.04	2.02E+02	0.0349	0.0349	Uranium 234	22	22	44.7	2.94E+06	0.0000	0.0000
Uranium 235	59	37	1.73	2.21E+02	0.0078	0.0078	Uranium 235	22	21	1.98	1.03E+05	0.0000	0.0000
Uranium 238	59	56	5.48	2.27E+02	0.0241	0.0241	Uranium 238	22	22	35.6	4.28E+04	0.0008	0.0008
Sum-of-the-Fractions					0.7859		**Sum-of-the-Fractions**					0.0030	
Total Ionizing Radiation in Water (rad/day)						0.7859	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0030

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.8**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-26. Total Ionizing Radiation in Surface Water and Riparian Sediment for Western Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	18	18	2.52	3.49E+00	0.7221	0.0722	Radium 226	6	6	18.7	8.61E+01	0.2172	0.0217
Radium 228	16	13	2.81	3.74E+00	0.7513	0.0751	Radium 228	4	4	3.96	9.12E+01	0.0434	0.0043
Thorium 232	3	2	0.225	1.83E+03	0.0001	0.0000	Thorium 232	4	4	3.14	6.11E+02	0.0051	0.0005
Uranium 234	17	16	38.1	6.84E+02	0.0557	0.0056	Uranium 234	4	4	39.1	5.27E+03	0.0074	0.0007
Uranium 235	15	14	18	7.47E+02	0.0241	0.0024	Uranium 235	4	4	2.72	3.74E+03	0.0007	0.0001
Uranium 238	17	16	34.4	7.68E+02	0.0448	0.0045	Uranium 238	4	4	37.5	2.50E+03	0.0150	0.0015
Sum-of-the-Fractions					1.5981		**Sum-of-the-Fractions**					0.2889	
Total Ionizing Radiation in Water (rad/day)						0.1598	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0289

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.2**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-27. Total Ionizing Radiation in Surface Water and Riparian Sediment for Central Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Riparian Sediment**						
Radium 226	18	18	1.75	3.49E+00	0.5014	0.0501	Radium 226	3	3	45.9	8.61E+01	0.5331	0.0533
Radium 228	16	12	3	3.74E+00	0.8021	0.0802	Radium 228	2	2	2.87	9.12E+01	0.0315	0.0031
Thorium 232	3	1	0.11	1.83E+03	0.0001	0.0000	Thorium 232	2	2	3.5	6.11E+02	0.0057	0.0006
Uranium 234	17	17	360	6.84E+02	0.5263	0.0526	Uranium 234	4	4	1560	5.27E+03	0.2960	0.0296
Uranium 235	17	16	18	7.47E+02	0.0241	0.0024	Uranium 235	4	4	66	3.74E+03	0.0176	0.0018
Uranium 238	17	16	360	7.68E+02	0.4688	0.0469	Uranium 238	4	4	1550	2.50E+03	0.6200	0.0620
Sum-of-the-Fractions					2.3228		**Sum-of-the-Fractions**					1.5040	
Total Ionizing Radiation in Water (rad/day)						0.2323	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.1504

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.4**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-28. Total Ionizing Radiation in Surface Water and Riparian Sediment for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	39	39	2.11	3.49E+00	0.6046	0.0605	Radium 226	4	4	8.32	8.61E+01	0.0966	0.0097
Radium 228	36	19	4.2	3.74E+00	1.1230	0.1123	Radium 228	4	4	2.64	9.12E+01	0.0289	0.0029
Thorium 232	16	6	0.134	1.83E+03	0.0001	0.0000	Thorium 232	4	4	1.99	6.11E+02	0.0033	0.0003
Uranium 234	37	36	64	6.84E+02	0.0936	0.0094	Uranium 234	4	4	17	5.27E+03	0.0032	0.0003
Uranium 235	35	33	22	7.47E+02	0.0295	0.0029	Uranium 235	4	4	0.621	3.74E+03	0.0002	0.0000
Uranium 238	37	37	58	7.68E+02	0.0755	0.0076	Uranium 238	4	4	11.8	2.50E+03	0.0047	0.0005
Sum-of-the-Fractions					1.9262		**Sum-of-the-Fractions**					0.1369	
Total Ionizing Radiation in Water (rad/day)						0.1926	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0137

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.2**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-29. Total Ionizing Radiation in Surface Water and Riparian Sediment for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	16	14	0.97	3.49E+00	0.2779	0.0278	Radium 226	1	1	15.3	8.61E+01	0.1777	0.0178
Radium 228	15	8	2.16	3.74E+00	0.5775	0.0578	Radium 228	1	1	3.13	9.12E+01	0.0343	0.0034
Thorium 232	6	3	0.0638	1.83E+03	0.0000	0.0000	Thorium 232[a]				6.11E+02	0.0000	0.0000
Uranium 234	15	14	73	6.84E+02	0.1067	0.0107	Uranium 234	2	2	45.8	5.27E+03	0.0087	0.0009
Uranium 235	13	12	6.5	7.47E+02	0.0087	0.0009	Uranium 235	2	2	2.2	3.74E+03	0.0006	0.0001
Uranium 238	15	15	72	7.68E+02	0.0938	0.0094	Uranium 238	2	2	41.9	2.50E+03	0.0168	0.0017
Sum-of-the-Fractions					1.0647		**Sum-of-the-Fractions**					0.2381	
Total Ionizing Radiation in Water (rad/day)						0.1065	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0238

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.1**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
a. Not Analyzed
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-30. Total Ionizing Radiation in Surface Water and Riparian Sediment for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Riparian Sediment						
Radium 226	30	25	5.1	3.49E+00	1.4613	0.1461	Radium 226	4	4	5.71	8.61E+01	0.0663	0.0066
Radium 228	29	18	2	3.74E+00	0.5348	0.0535	Radium 228	4	4	4.15	9.12E+01	0.0455	0.0046
Thorium 232	9	3	0.234	1.83E+03	0.0001	0.0000	Thorium 232[a]				6.11E+02	0.0000	0.0000
Uranium 234	29	28	46	6.84E+02	0.0673	0.0067	Uranium 234	4	4	15.7	5.27E+03	0.0030	0.0003
Uranium 235	26	23	9.4	7.47E+02	0.0126	0.0013	Uranium 235	4	4	1.32	3.74E+03	0.0004	0.0000
Uranium 238	29	29	32	7.68E+02	0.0417	0.0042	Uranium 238	4	4	14.9	2.50E+03	0.0060	0.0006
Sum-of-the-Fractions					2.1177		**Sum-of-the-Fractions**					0.1211	
Total Ionizing Radiation in Water (rad/day)						0.2118	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0121

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.2**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
a. Not Analyzed
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-31. Total Ionizing Radiation in Surface Water and Riparian Sediment for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	9	5	0.471	3.49E+00	0.1350	0.0135	Radium 226	1	1	1.44	8.61E+01	0.0167	0.0017
Radium 228	9	5	3	3.74E+00	0.8021	0.0802	Radium 228	1	1	1.82	9.12E+01	0.0200	0.0020
Thorium 232	9	3	0.231	1.83E+03	0.0001	0.0000	Thorium 232[a]				6.11E+02	0.0000	0.0000
Uranium 234	9	9	9.7	6.84E+02	0.0142	0.0014	Uranium 234	1	1	2.84	5.27E+03	0.0005	0.0001
Uranium 235	9	6	0.724	7.47E+02	0.0010	0.0001	Uranium 235	1	1	0.164	3.74E+03	0.0000	0.0000
Uranium 238	9	9	8.81	7.68E+02	0.0115	0.0011	Uranium 238	1	1	2.88	2.50E+03	0.0012	0.0001
Sum-of-the-Fractions					0.9638		**Sum-of-the-Fractions**					0.0384	
Total Ionizing Radiation in Water (rad/day)						0.0964	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0038

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.1**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
a. Not Analyzed
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-32. Total Ionizing Radiation in Surface Water and Surface Soil of Mined Area for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	14	14	71.3	6.94E+03	0.0103	0.0010	Radium 226	119	114	879.8	4.31E+01	20.4130	2.0413
Radium 228	14	12	7	7.42E+03	0.0009	0.0001	Radium 228	27	24	7.66	4.56E+01	0.1680	0.0168
Thorium 232	4	3	47.2	5.55E+04	0.0009	0.0001	Thorium 232	27	15	10.9	4.05E+02	0.0269	0.0027
Uranium 234	14	14	8100	4.05E+05	0.0200	0.0020	Uranium 234	83	83	411.9	5.13E+03	0.0803	0.0080
Uranium 235	14	13	895	4.25E+05	0.0021	0.0002	Uranium 235	83	72	18.94	2.76E+03	0.0069	0.0007
Uranium 238	14	14	8000	4.12E+05	0.0194	0.0019	Uranium 238	83	83	417	1.58E+03	0.2639	0.0264
Sum-of-the-Fractions					0.0536		**Sum-of-the-Fractions**					20.9590	
Total Ionizing Radiation in Water (rad/day)						0.0054	**Total Ionizing Radiation in Surface Soil (rad/day)**						2.0959

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **2.1**

Result: Exceeds the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Pit 3

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-33. Total Ionizing Radiation in Surface Water and Surface Soil for Northeast Area of PIA for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)**[2]	**Partial Fraction**	**Rad/day**	**Radionuclide**[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)**[2]	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Surface Soil**						
Radium 226	1	1	13.4	6.94E+03	0.0019	0.0002	Radium 226	27	27	43.61	4.31E+01	1.0118	0.1012
Radium 228	1	1	1.43	7.42E+03	0.0002	0.0000	Radium 228	16	16	1.58	4.56E+01	0.0346	0.0035
Thorium 232	1	1	10.5	5.55E+04	0.0002	0.0000	Thorium 232	16	16	1.87	4.05E+02	0.0046	0.0005
Uranium 234	1	1	295	4.05E+05	0.0007	0.0001	Uranium 234	21	21	54.56	5.13E+03	0.0106	0.0011
Uranium 235	1	1	19	4.25E+05	0.0000	0.0000	Uranium 235	21	20	2.266	2.76E+03	0.0008	0.0001
Uranium 238	1	1	357	4.12E+05	0.0009	0.0001	Uranium 238	21	21	55.07	1.58E+03	0.0349	0.0035
Sum-of-the-Fractions					0.0040		**Sum-of-the-Fractions**					1.0974	
Total Ionizing Radiation in Water (rad/day)						0.0004	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.1097

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.11**

Result: Exceeds the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-34. Total Ionizing Radiation in Surface Water and Surface Soil for Southwest Area of PIA for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	2.52	6.94E+03	0.0004	0.0000	Radium 226	18	18	17.42	4.31E+01	0.4042	0.0404
Radium 228	16	13	2.81	7.42E+03	0.0004	0.0000	Radium 228	16	16	2.85	4.56E+01	0.0625	0.0063
Thorium 232	3	2	0.225	5.55E+04	0.0000	0.0000	Thorium 232	16	16	2.13	4.05E+02	0.0053	0.0005
Uranium 234	17	16	38.1	4.05E+05	0.0001	0.0000	Uranium 234	16	16	5.07	5.13E+03	0.0010	0.0001
Uranium 235	15	14	18	4.25E+05	0.0000	0.0000	Uranium 235	16	15	0.304	2.76E+03	0.0001	0.0000
Uranium 238	17	16	34.4	4.12E+05	0.0001	0.0000	Uranium 238	16	16	5.18	1.58E+03	0.0033	0.0003
Sum-of-the-Fractions					0.0010		**Sum-of-the-Fractions**					0.4763	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0476

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.05**

Result: Does not exceed the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water derived from Western Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-35. Total Ionizing Radiation in Surface Water and Surface Soil of East Haul Road for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Surface Soil**						
Radium 226	39	39	2.11	6.94E+03	0.0003	0.0000	Radium 226	19	19	49.4	4.31E+01	1.1462	0.1146
Radium 228	36	19	4.2	7.42E+03	0.0006	0.0001	Radium 228	12	12	2.63	4.56E+01	0.0577	0.0058
Thorium 232	16	6	0.134	5.55E+04	0.0000	0.0000	Thorium 232	12	12	2.8	4.05E+02	0.0069	0.0007
Uranium 234	37	36	64	4.05E+05	0.0002	0.0000	Uranium 234	17	17	34	5.13E+03	0.0066	0.0007
Uranium 235	35	33	22	4.25E+05	0.0001	0.0000	Uranium 235	17	16	3.56	2.76E+03	0.0013	0.0001
Uranium 238	37	37	58	4.12E+05	0.0001	0.0000	Uranium 238	17	17	29.7	1.58E+03	0.0188	0.0019
Sum-of-the-Fractions					0.0012		**Sum-of-the-Fractions**					1.2375	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.1237

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.1**

Result: Exceeds the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-36. Total Ionizing Radiation in Surface Water and Surface Soil of West Haul Road for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	2.52	6.94E+03	0.0004	0.0000	Radium 226	6	6	117	4.31E+01	2.7146	0.2715
Radium 228	16	13	2.81	7.42E+03	0.0004	0.0000	Radium 228	4	4	2.96	4.56E+01	0.0649	0.0065
Thorium 232	3	2	0.225	5.55E+04	0.0000	0.0000	Thorium 232	4	3	3.58	4.05E+02	0.0088	0.0009
Uranium 234	17	16	38.1	4.05E+05	0.0001	0.0000	Uranium 234	6	6	82.7	5.13E+03	0.0161	0.0016
Uranium 235	15	14	18	4.25E+05	0.0000	0.0000	Uranium 235	6	6	8.56	2.76E+03	0.0031	0.0003
Uranium 238	17	16	34.4	4.12E+05	0.0001	0.0000	Uranium 238	6	6	86.8	1.58E+03	0.0549	0.0055
Sum-of-the-Fractions					0.0010		**Sum-of-the-Fractions**					2.8625	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.2863

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.3**

Result: Exceeds the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-37. Total Ionizing Radiation in Surface Water and Surface Soil of Background for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	40	40	4.36	6.94E+03	0.0006	0.0001	Radium 226	78	77	8.94	4.31E+01	0.2074	0.0207
Radium 228	40	13	1.99	7.42E+03	0.0003	0.0000	Radium 228	41	41	4.404	4.56E+01	0.0966	0.0097
Thorium 232	38	26	2.18	5.55E+04	0.0000	0.0000	Thorium 232	41	41	4.98	4.05E+02	0.0123	0.0012
Uranium 234	59	57	7.04	4.05E+05	0.0000	0.0000	Uranium 234	60	59	19.5	5.13E+03	0.0038	0.0004
Uranium 235	59	37	1.73	4.25E+05	0.0000	0.0000	Uranium 235	60	59	0.83	2.76E+03	0.0003	0.0000
Uranium 238	59	56	5.48	4.12E+05	0.0000	0.0000	Uranium 238	60	60	15.2	1.58E+03	0.0096	0.0010
Sum-of-the-Fractions					0.0010		**Sum-of-the-Fractions**					0.3300	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0330

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-38. Total Ionizing Radiation in Surface Water and Subsurface Soil for Northeast Area of PIA for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	1	1	13.4	6.94E+03	0.0019	0.0002	Radium 226	6	6	2.91	4.31E+01	0.0675	0.0068
Radium 228	1	1	1.43	7.42E+03	0.0002	0.0000	Radium 228	6	6	1.47	4.56E+01	0.0322	0.0032
Thorium 232	1	1	10.5	5.55E+04	0.0002	0.0000	Thorium 232	6	6	1.38	4.05E+02	0.0034	0.0003
Uranium 234	1	1	295	4.05E+05	0.0007	0.0001	Uranium 234	6	6	3.09	5.13E+03	0.0006	0.0001
Uranium 235	1	1	19	4.25E+05	0.0000	0.0000	Uranium 235	6	6	0.24	2.76E+03	0.0001	0.0000
Uranium 238	1	1	357	4.12E+05	0.0009	0.0001	Uranium 238	6	6	3.34	1.58E+03	0.0021	0.0002
Sum-of-the-Fractions					0.0040		**Sum-of-the-Fractions**					0.1060	
Total Ionizing Radiation in Water (rad/day)						0.0004	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0106

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.011**

Result: Does not exceed the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-39. Total Ionizing Radiation in Surface Water and Subsurface Soil for Southwest area of PIA for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	2.52	6.94E+03	0.0004	0.0000	Radium 226	6	6	2.93	4.31E+01	0.0680	0.0068
Radium 228	16	13	2.81	7.42E+03	0.0004	0.0000	Radium 228	6	6	2.89	4.56E+01	0.0634	0.0063
Thorium 232	3	2	0.225	5.55E+04	0.0000	0.0000	Thorium 232	6	6	2.2	4.05E+02	0.0054	0.0005
Uranium 234	17	16	38.1	4.05E+05	0.0001	0.0000	Uranium 234	6	6	2.43	5.13E+03	0.0005	0.0000
Uranium 235	15	14	18	4.25E+05	0.0000	0.0000	Uranium 235	6	6	0.15	2.76E+03	0.0001	0.0000
Uranium 238	17	16	34.4	4.12E+05	0.0001	0.0000	Uranium 238	6	6	2.23	1.58E+03	0.0014	0.0001
Sum-of-the-Fractions					0.0010		**Sum-of-the-Fractions**					0.1387	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0139

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.01**

Result: Does not exceed the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-40. Total Ionizing Radiation in Surface Water and Subsurface Soil of East Haul Road for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							Sub-Surface Soil						
Radium 226	39	39	2.11	6.94E+03	0.0003	0.0000	Radium 226	5	5	43.6	4.31E+01	1.0116	0.1012
Radium 228	36	19	4.2	7.42E+03	0.0006	0.0001	Radium 228	5	5	3.3	4.56E+01	0.0724	0.0072
Thorium 232	16	6	0.134	5.55E+04	0.0000	0.0000	Thorium 232	5	5	4.71	4.05E+02	0.0116	0.0012
Uranium 234	37	36	64	4.05E+05	0.0002	0.0000	Uranium 234	5	5	15.2	5.13E+03	0.0030	0.0003
Uranium 235	35	33	22	4.25E+05	0.0001	0.0000	Uranium 235	5	5	0.917	2.76E+03	0.0003	0.0000
Uranium 238	37	37	58	4.12E+05	0.0001	0.0000	Uranium 238	5	5	15.9	1.58E+03	0.0101	0.0010
Sum-of-the-Fractions					0.0012		**Sum-of-the-Fractions**					1.1090	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.1109

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.11**

Result: Exceeds the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-41. Total Ionizing Radiation in Surface Water and Subsurface Soil of West Haul Road for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	2.52	6.94E+03	0.0004	0.0000	Radium 226	1	1	2.88	4.31E+01	0.0668	0.0067
Radium 228	16	13	2.81	7.42E+03	0.0004	0.0000	Radium 228	1	1	3.36	4.56E+01	0.0737	0.0074
Thorium 232	3	2	0.225	5.55E+04	0.0000	0.0000	Thorium 232	1	1	2.96	4.05E+02	0.0073	0.0007
Uranium 234	17	16	38.1	4.05E+05	0.0001	0.0000	Uranium 234	1	1	2.55	5.13E+03	0.0005	0.0000
Uranium 235	15	14	18	4.25E+05	0.0000	0.0000	Uranium 235	1	1	0.139	2.76E+03	0.0001	0.0000
Uranium 238	17	16	34.4	4.12E+05	0.0001	0.0000	Uranium 238	1	1	2.42	1.58E+03	0.0015	0.0002
Sum-of-the-Fractions					0.0010		**Sum-of-the-Fractions**					0.1499	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0150

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.02**

Result: Does not exceed the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-42. Total Ionizing Radiation in Surface Water and Subsurface Soil of Background for Terrestrial Animal
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	40	40	4.36	6.94E+03	0.0006	0.0001	Radium 226	16	16	3.87	4.31E+01	0.0898	0.0090
Radium 228	40	13	1.99	7.42E+03	0.0003	0.0000	Radium 228	16	16	3.59	4.56E+01	0.0787	0.0079
Thorium 232	38	26	2.18	5.55E+04	0.0000	0.0000	Thorium 232	16	16	3.1	4.05E+02	0.0077	0.0008
Uranium 234	59	57	7.04	4.05E+05	0.0000	0.0000	Uranium 234	16	16	18.4	5.13E+03	0.0036	0.0004
Uranium 235	59	37	1.73	4.25E+05	0.0000	0.0000	Uranium 235	16	16	0.898	2.76E+03	0.0003	0.0000
Uranium 238	59	56	5.48	4.12E+05	0.0000	0.0000	Uranium 238	16	16	14.4	1.58E+03	0.0091	0.0009
Sum-of-the-Fractions					0.0010		**Sum-of-the-Fractions**					0.1892	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0189

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.02**

Result: Does not exceed the 0.1 rad/day criteria for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-43. Total Ionizing Radiation in Surface Water and Surface Soil of Mined Area for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	14	14	71.3	1.14E+07	0.0000	0.0000	Radium 226	119	114	879.8	2.46E+02	3.5764	3.5764
Radium 228	14	12	7	1.07E+07	0.0000	0.0000	Radium 228	27	24	7.66	2.61E+02	0.0293	0.0293
Thorium 232	4	3	47.2	1.07E+07	0.0000	0.0000	Thorium 232	27	15	10.9	4.44E+03	0.0025	0.0025
Uranium 234	14	14	8100	2.94E+09	0.0000	0.0000	Uranium 234	83	83	411.9	5.16E+04	0.0080	0.0080
Uranium 235	14	13	895	1.03E+08	0.0000	0.0000	Uranium 235	83	72	18.94	2.74E+04	0.0007	0.0007
Uranium 238	14	14	8000	4.28E+07	0.0002	0.0002	Uranium 238	83	83	417	1.58E+04	0.0264	0.0264
Sum-of-the-Fractions					0.0002		**Sum-of-the-Fractions**					3.6433	
Total Ionizing Radiation in Water (rad/day)						0.0002	**Total Ionizing Radiation in Surface Soil (rad/day)**						3.6433

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **3.6**

Result: Exceeds the 1.0 rad/day criteria for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Pit 3

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-44. Total Ionizing Radiation in Surface Water and Surface Soil for Northeast Area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							Surface Soil						
Radium 226	1	1	13.4	1.14E+07	0.0000	0.0000	Radium 226	27	27	43.61	2.46E+02	0.1773	0.1773
Radium 228	1	1	1.43	1.07E+07	0.0000	0.0000	Radium 228	16	16	1.58	2.61E+02	0.0061	0.0061
Thorium 232	1	1	10.5	1.07E+07	0.0000	0.0000	Thorium 232	16	16	1.87	4.44E+03	0.0004	0.0004
Uranium 234	1	1	295	2.94E+09	0.0000	0.0000	Uranium 234	21	21	54.56	5.16E+04	0.0011	0.0011
Uranium 235	1	1	19	1.03E+08	0.0000	0.0000	Uranium 235	21	20	2.266	2.74E+04	0.0001	0.0001
Uranium 238	1	1	357	4.28E+07	0.0000	0.0000	Uranium 238	21	21	55.07	1.58E+04	0.0035	0.0035
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.1884	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.1884

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.19**

Result: Does not exceed the 1.0 rad/day criteria for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-45. Total Ionizing Radiation in Surface Water and Surface Soil for Southwest Area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	2.52	1.14E+07	0.0000	0.0000	Radium 226	18	18	17.42	2.46E+02	0.0708	0.0708
Radium 228	16	13	2.81	1.07E+07	0.0000	0.0000	Radium 228	16	16	2.85	2.61E+02	0.0109	0.0109
Thorium 232	3	2	0.225	1.07E+07	0.0000	0.0000	Thorium 232	16	16	2.13	4.44E+03	0.0005	0.0005
Uranium 234	17	16	38.1	2.94E+09	0.0000	0.0000	Uranium 234	16	16	5.07	5.16E+04	0.0001	0.0001
Uranium 235	15	14	18	1.03E+08	0.0000	0.0000	Uranium 235	16	15	0.304	2.74E+04	0.0000	0.0000
Uranium 238	17	16	34.4	4.28E+07	0.0000	0.0000	Uranium 238	16	16	5.18	1.58E+04	0.0003	0.0003
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0826	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0826

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.08**

Result: Does not exceed the 1.0 rad/day criteria for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water derived from Western Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-46. Total Ionizing Radiation in Surface Water and Surface Soil of East Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	39	39	2.11	1.14E+07	0.0000	0.0000	Radium 226	19	19	49.4	2.46E+02	0.2008	0.2008
Radium 228	36	19	4.2	1.07E+07	0.0000	0.0000	Radium 228	12	12	2.63	2.61E+02	0.0101	0.0101
Thorium 232	16	6	0.134	1.07E+07	0.0000	0.0000	Thorium 232	12	12	2.8	4.44E+03	0.0006	0.0006
Uranium 234	37	36	64	2.94E+09	0.0000	0.0000	Uranium 234	17	17	34	5.16E+04	0.0007	0.0007
Uranium 235	35	33	22	1.03E+08	0.0000	0.0000	Uranium 235	17	16	3.56	2.74E+04	0.0001	0.0001
Uranium 238	37	37	58	4.28E+07	0.0000	0.0000	Uranium 238	17	17	29.7	1.58E+04	0.0019	0.0019
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.2142	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.2142

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day criteria for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-47. Total Ionizing Radiation in Surface Water and Surface Soil of West Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	2.52	1.14E+07	0.0000	0.0000	Radium 226	6	6	117	2.46E+02	0.4756	0.4756
Radium 228	16	13	2.81	1.07E+07	0.0000	0.0000	Radium 228	4	4	2.96	2.61E+02	0.0113	0.0113
Thorium 232	3	2	0.225	1.07E+07	0.0000	0.0000	Thorium 232	4	3	3.58	4.44E+03	0.0008	0.0008
Uranium 234	17	16	38.1	2.94E+09	0.0000	0.0000	Uranium 234	6	6	82.7	5.16E+04	0.0016	0.0016
Uranium 235	15	14	18	1.03E+08	0.0000	0.0000	Uranium 235	6	6	8.56	2.74E+04	0.0003	0.0003
Uranium 238	17	16	34.4	4.28E+07	0.0000	0.0000	Uranium 238	6	6	86.8	1.58E+04	0.0055	0.0055
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.4952	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.4952

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.5**

Result: Does not exceed the 1.0 rad/day criteria for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-48. Total Ionizing Radiation in Surface Water and Surface Soil of Background for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	40	40	4.36	1.14E+07	0.0000	0.0000	Radium 226	78	77	8.94	2.46E+02	0.0363	0.0363
Radium 228	40	13	1.99	1.07E+07	0.0000	0.0000	Radium 228	41	41	4.404	2.61E+02	0.0169	0.0169
Thorium 232	38	26	2.18	1.07E+07	0.0000	0.0000	Thorium 232	41	41	4.98	4.44E+03	0.0011	0.0011
Uranium 234	59	57	7.04	2.94E+09	0.0000	0.0000	Uranium 234	60	59	19.5	5.16E+04	0.0004	0.0004
Uranium 235	59	37	1.73	1.03E+08	0.0000	0.0000	Uranium 235	60	59	0.83	2.74E+04	0.0000	0.0000
Uranium 238	59	56	5.48	4.28E+07	0.0000	0.0000	Uranium 238	60	60	15.2	1.58E+04	0.0010	0.0010
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0557	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0557

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.1**

Result: Does not exceed the 1.0 rad/day criteria for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-49. Total Ionizing Radiation in Surface Water and Subsurface Soil for Northeast Area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							Sub-Surface Soil						
Radium 226	1	1	13.4	1.14E+07	0.0000	0.0000	Radium 226	6	6	2.91	2.46E+02	0.0118	0.0118
Radium 228	1	1	1.43	1.07E+07	0.0000	0.0000	Radium 228	6	6	1.47	2.61E+02	0.0056	0.0056
Thorium 232	1	1	10.5	1.07E+07	0.0000	0.0000	Thorium 232	6	6	1.38	4.44E+03	0.0003	0.0003
Uranium 234	1	1	295	2.94E+09	0.0000	0.0000	Uranium 234	6	6	3.09	5.16E+04	0.0001	0.0001
Uranium 235	1	1	19	1.03E+08	0.0000	0.0000	Uranium 235	6	6	0.24	2.74E+04	0.0000	0.0000
Uranium 238	1	1	357	4.28E+07	0.0000	0.0000	Uranium 238	6	6	3.34	1.58E+04	0.0002	0.0002
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0181	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0181

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.018**

Result: Does not exceed the 1.0 rad/day for Terrestrial Plants

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-50. Total Ionizing Radiation in Surface Water and Subsurface Soil for Southwest area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	2.52	1.14E+07	0.0000	0.0000	Radium 226	6	6	2.93	2.46E+02	0.0119	0.0119
Radium 228	16	13	2.81	1.07E+07	0.0000	0.0000	Radium 228	6	6	2.89	2.61E+02	0.0111	0.0011
Thorium 232	3	2	0.225	1.07E+07	0.0000	0.0000	Thorium 232	6	6	2.2	4.44E+03	0.0005	0.0000
Uranium 234	17	16	38.1	2.94E+09	0.0000	0.0000	Uranium 234	6	6	2.43	5.16E+04	0.0000	0.0000
Uranium 235	15	14	18	1.03E+08	0.0000	0.0000	Uranium 235	6	6	0.15	2.74E+04	0.0000	0.0000
Uranium 238	17	16	34.4	4.28E+07	0.0000	0.0000	Uranium 238	6	6	2.23	1.58E+04	0.0001	0.0000
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0237	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0131

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.01**

Result: Does not exceed the 1.0 rad/day for Terrestrial Plants

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-51. Total Ionizing Radiation in Surface Water and Subsurface Soil of East Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							Sub-Surface Soil						
Radium 226	39	39	2.11	1.14E+07	0.0000	0.0000	Radium 226	5	5	43.6	2.46E+02	0.1772	0.1772
Radium 228	36	19	4.2	1.07E+07	0.0000	0.0000	Radium 228	5	5	3.3	2.61E+02	0.0126	0.0013
Thorium 232	16	6	0.134	1.07E+07	0.0000	0.0000	Thorium 232	5	5	4.71	4.44E+03	0.0011	0.0001
Uranium 234	37	36	64	2.94E+09	0.0000	0.0000	Uranium 234	5	5	15.2	5.16E+04	0.0003	0.0000
Uranium 235	35	33	22	1.03E+08	0.0000	0.0000	Uranium 235	5	5	0.917	2.74E+04	0.0000	0.0000
Uranium 238	37	37	58	4.28E+07	0.0000	0.0000	Uranium 238	5	5	15.9	1.58E+04	0.0010	0.0001
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.1923	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.1787

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.18**

Result: Does not exceed the 1.0 rad/day for Terrestrial Plants

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/L)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Maximum Detection (pCi/g)	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							Sub-Surface Soil						
Radium 226	18	18	2.52	1.14E+07	0.0000	0.0000	Radium 226	1	1	2.88	2.46E+02	0.0117	0.0117
Radium 228	16	13	2.81	1.07E+07	0.0000	0.0000	Radium 228	1	1	3.36	2.61E+02	0.0129	0.0013
Thorium 232	3	2	0.225	1.07E+07	0.0000	0.0000	Thorium 232	1	1	2.96	4.44E+03	0.0007	0.0001
Uranium 234	17	16	38.1	2.94E+09	0.0000	0.0000	Uranium 234	1	1	2.55	5.16E+04	0.0000	0.0000
Uranium 235	15	14	18	1.03E+08	0.0000	0.0000	Uranium 235	1	1	0.139	2.74E+04	0.0000	0.0000
Uranium 238	17	16	34.4	4.28E+07	0.0000	0.0000	Uranium 238	1	1	2.42	1.58E+04	0.0002	0.0000
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0255	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0131

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.01**

Result: Does not exceed the 1.0 rad/day for Terrestrial Plants

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table H-53. Total Ionizing Radiation in Surface Water and Subsurface Soil of Background for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/L)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Maximum Detection (pCi/g)**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	40	40	4.36	1.14E+07	0.0000	0.0000	Radium 226	16	16	3.87	2.46E+02	0.0157	0.0157
Radium 228	40	13	1.99	1.07E+07	0.0000	0.0000	Radium 228	16	16	3.59	2.61E+02	0.0138	0.0138
Thorium 232	38	26	2.18	1.07E+07	0.0000	0.0000	Thorium 232	16	16	3.1	4.44E+03	0.0007	0.0007
Uranium 234	59	57	7.04	2.94E+09	0.0000	0.0000	Uranium 234	16	16	18.4	5.16E+04	0.0004	0.0004
Uranium 235	59	37	1.73	1.03E+08	0.0000	0.0000	Uranium 235	16	16	0.898	2.74E+04	0.0000	0.0000
Uranium 238	59	56	5.48	4.28E+07	0.0000	0.0000	Uranium 238	16	16	14.4	1.58E+04	0.0009	0.0009
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0315	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0315

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.03**

Result: Does not exceed the 1.0 rad/day for Terrestrial Plants

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Appendix I - Contaminant Fate and Transport
Midnite Mine Site
Final Report

APPENDIX I: CONTAMINANT FATE AND TRANSPORT

I.1 Aluminum

Because of its strong reactivity, aluminum (Al) is not found as a free metal in nature. Aluminum has only one oxidation state (+3), thus its behavior in the environment depends on its ordination chemistry and the surrounding conditions. In soils, a low pH generally results in an increase in Al mobility. In water, an equilibrium with a solid phase is established that controls the extent of Al dissolution (ATSDR 1990).

Plants vary in their ability to remove Al from soils, although bioconcentration factors (BCFs) for plants are generally less than 1.0. Biomagnification of Al in terrestrial food chains does not appear to occur. No data could be found on the biomagnification of Al in aquatic food chains (ATSDR 1990).

The nervous system may be a target area for Al. Aluminum accumulates in neurofibrillary tangles in humans with Alzheimer's disease. Aluminum may also interact with neuronal deoxyribonucleic acid (DNA) to alter gene expression and protein formation. Mammalian studies do not indicate that Al affects reproduction although some developmental effects have been reported in mammals (ATSDR 1990).

ATSDR (Agency for Toxic Substances and Disease Registry). 1990. *Toxicological Profile for Aluminum.* Report prepared by the Research Triangle Institute for the U.S. Aluminum.

I.2 Antimony

Antimony (Sb) is a silvery white metal of medium hardness and low solubility in water. It is found at very low levels in the environment. Metallic Sb is stable under ordinary conditions and is not readily altered by air or water. Antimony displays four oxidation states, Sb^{-3}, Sb^{0}, Sb^{+3}, and Sb^{+5}. The trivalent (Sb^{+3}) state is the most stable and common (ATSDR 1991).

The speciation and physicochemical state of Sb are important to its behavior in the environment and availability to biota. Antimony that is incorporated into mineral lattices is inert and unlikely to be bioavailable. Unfortunately, most analytical methods for Sb do not distinguish between this form and adsorbed forms. Little is known about the adsorption of Sb in soil; however, since Sb forms anionic species, adsorption should be greatest under weakly acidic conditions. Antimony's adsorption to soil and sediment is primarily correlated with iron (Fe), manganese (Mn), and Al content; it coprecipitates with hydroxylated oxides of these elements (ATSDR 1991).

As a natural constituent of soil, Sb is transported into streams and waterways from natural weathering of soil and anthropogenic sources. It has a low occurrence in ambient waters. Antimony in aerobic freshwater and seawater is largely in the +5 oxidation state. Trivalent Sb is the dominant oxidation state in anaerobic water. Antimony can be reduced and methylated by microorganisms in anaerobic sediment, releasing volatile methylated Sb compounds into the water (ATSDR 1991).

Antimony does not appear to bioconcentrate appreciably in fish or other aquatic organisms. Much of the Sb occurring in plants has been found to be a result of surface deposition. Uptake of Sb from soil by plants is reported to be minor. Body burden analyses of terrestrial organisms suggest that biomagnification of Sb does not occur from lower to higher trophic levels (ATSDR 1991).

ATSDR (Agency for Toxic Substances and Disease Registry). 1991. *Toxicological Profile for Antimony.* Report prepared by the Research Triangle Institute for the U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

I.3 Arsenic

Arsenic (As) has four valence states (-3, 0, +3, and +5), rarely occurring in its free state in nature. It is usually a component of sulfidic ores, occurring as arsenides and arsenates, along with As trioxide, a weathering product of arsenides. Biotransformations may occur, resulting in volatile arsenicals that normally are returned to land where soil adsorption, plant uptake, erosion, leaching, reduction to arsines, and other processes occur. Inorganic As is more mobile than organic As, and thus poses greater problems by leaching into surface waters and groundwater. The trivalent As^{+3} species are generally considered to be more toxic, more soluble, and more mobile than the pentavalent (As^{+5}) species (Eisler 1988).

Arsenic in water exists primarily as a dissolved ionic species. Particulates account for less than one percent (%) of the total measurable As. Arsenates are more strongly adsorbed to sediments than other As forms. In bodies of water that become stratified in summer, As released from sediment accumulates in the hypolimnion until turnover, when it is mixed with epilimnetic waters. This mixing may result in a 10 to 20 % increase in As concentrations (Eisler 1988).

Eisler (1988) reports the following points: (1) As may be absorbed by ingestion, inhalation, or through permeation of the skin or mucous membrane, (2) cells accumulate As by using an active transport system normally used in phosphate transport, (3) arsenicals are readily absorbed after ingestion, most being rapidly excreted in the urine during the first few days, (4) the toxicity of arsenicals conforms to the following order from greatest to least toxicity: arsines > inorganic arsenites > organic trivalent compounds (arsenoxides) > inorganic arsenates > organic pentavalent compounds > arsonium compounds > elemental As, (5) solubility in water and body fluids appear to be directly related to toxicity, and (6) the mechanisms of arsenical toxicity differ considerably among As species, although signs of poisoning appear similar for all arsenicals.

The primary mechanism of inorganic As^{+3} toxicity is through reaction with sulfhydryl groups of proteins and subsequent enzyme inhibition; inorganic As^{+5} does not react as readily with sulfhydryl groups. Inorganic As^{+3} interrupts oxidative metabolic pathways and sometimes cause morphological changes in liver mitochondria. Methylation greatly reduces the toxicity of inorganic As (both As^{+3} and As^{+5}) and is usually the major detoxification mechanism (Eisler 1988).

The mechanism of organic As toxicity begins with its initial metabolism to the trivalent arsenoxide form, followed by its subsequent reaction with sulfhydryl groups of tissue proteins and enzymes, to form an arylblis (organylthio) arsine. This form inhibits oxidative degradation of carbohydrates and decreases cellular adenosine triphosphate (ATP) (Eisler 1988).

Eisler, R. 1988. Arsenic Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. *U.S. Fish and Wildlife Service Biological Report*, 85(1.12). 92p.

I.4 Barium

Barium (Ba) is widely distributed in both terrestrial and aquatic environments. Although it is found in most aquatic environments, Ba usually precipitates out in the form of insoluble salts (U.S. EPA 1984). Transport of Ba by suspended sediments in lotic water bodies may be significant. Volatilization is not a significant fate process (HSDB 2002). Barium is not expected to bioconcentrate significantly in plants or freshwater aquatic organisms.

The chemical form of Ba largely dictates its adsorption into soils and sediments. Barium in sediments is found largely in the relatively insoluble forms of barium sulfate and barium carbonate. Humic and fulvic acid have not been found to increase the mobility of Ba (ATSDR 1992).

Based on its dissociation constant [(K_d); value of 60 reported in Baes *et al.* 1984], Ba would be expected to adsorb to soil and sediment. Soils with high cation exchange capacity (CEC) adsorb Ba and limit its mobility. Barium is more mobile and more likely to be leached from soils in the presence of chloride due to the solubility of barium chloride relative to other forms of Ba (ATSDR 1992).

Barium will be taken up by plants under certain environmental conditions, but generally at concentrations less than the surrounding soils (Baes *et al.* 1984). While bioconcentration has been found to be significant in marine systems, it is less significant in freshwater systems (ATSDR 1992).

ATSDR (Agency for Toxic Substances and Disease Registry). 1992. *Toxicological Profile for Barium and Compounds*. Prepared by Clement International Corporation for ATSDR. PB93-110658.

Baes, C.F. III., R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. *A review and analysis of parameters for assessing transport of environmentally released radionuclides through agriculture*. Oak Ridge National Laboratory Report ORNL-5786.

HSDB. 2002. (Hazardous Substances Data Bank). U.S. National Library of Medicine, National Institutes of Health, Department of Health and Human Services. http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB. December 9 2002

U.S. EPA (1984). Health effects assessment for barium. Prepared by Environmental Criteria and Assessment office, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA/540/1-86/021.

I.5 Beryllium

The majority of anthropomorphically-produced beryllium (Be) in the environment is the result of coal and oil combustion. Beryllium naturally enters waterways through the weathering of rock and soil, and through deposition of atmospheric Be. Upon reaching water and soil, Be is most likely retained as an insoluble form that is generally immobile. However, beryllium chloride, fluoride, nitrate, phosphate, and sulfate (tetrahydrate) are all water-soluble forms. Although chemical reactions may transform one Be compound into another, Be cannot be degraded by environmental reactions (ATSDR 1993).

Due to its geochemical similarity to Al, Be may be expected to adsorb onto clay surfaces at low pH, and may remain precipitated as insoluble complexes at higher pH. Therefore, Be is expected to have limited mobility in soil (ATSDR 1993).

Beryllium is not expected to bioconcentrate in aquatic animals and no evidence for significant biomagnification within food chains has been found. Beryllium is extremely toxic to warm water fish in soft water. The degree of toxicity decreases with increasing hardness (ATSDR 1993).

Major exposure routes for aquatic ecological receptors include ingestion of contaminated soil and sediment. Although several studies point out the negative effects of Be in mammalian systems, no studies that evaluated the relationship between sediment Be concentration and observed toxicity to benthic organisms could not be found (ATSDR 1993).

ATSDR (Agency for Toxic Substances and Disease Registry). 1993. *Toxicological Profile for Beryllium.* Report prepared by the Research Triangle Institute for the U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

I.6 Cadmium

Cadmium (Cd) is a naturally occurring element that is widely distributed in the earth's crust. It is rarely found in the pure state. Among natural sources, zinc (Zn), lead (Pb) and copper (Cu) ore are the main sources of Cd.

The mobility of Cd in the environment and potential effects on an ecosystem primarily depend on the nature of the salts. Cadmium salts including the sulfide, carbonate, or oxide are practically insoluble in water. These can be converted to water-soluble salts under the influence of oxygen and acids; the sulfate, nitrate and halogenates are soluble in water (Dobson 1992). Organocadmium compounds (where the metal is covalently bound to carbon) do not occur naturally in nature. Cadmium may be bound to proteins or other organic molecules and form salts with organic acids, but it is still regarded as inorganic in these forms.

Sources of Cd emissions to air are primarily ferrous and non-ferrous metal production, oil and coal combustion, and waste incineration (Thornton 1992). Cadmium may also enter the atmosphere from weathering of rocks, windblown soil, and volcanos. Volcanic activity is the major natural source of Cd, due to the large quantities of particulate matter emitted. However, natural sources are generally minor compared with anthropogenic ones. When released to the atmosphere, Cd generally occurs as particulate matter, and is subject to wet and dry deposition. Cadmium is expected to be transformed to the oxide and carbonate in the atmosphere (Hazardous Substances Database (HSDB) 1999).

Cadmium is released to soil via landfilling of large volume waste such as ash from fossil fuel combustion, municipal solid waste, and sewage sludge; these sources generally contain low concentrations of Cd. Cadmium is also introduced to soil through agricultural use of phosphate fertilizers. Cadmium released to soil is largely retained in surface soil layers. Adsorption increases with pH and the organic content of the soil. Cadmium adsorption also correlates with the CEC of the soil. Cadmium is adsorbed to soil to a much lesser extent than most other heavy metals (Elliott 1986). Once in soil, Cd converts to insoluble forms such as the carbonate in aerobic environments and the sulfide in anaerobic ones (Hazardous Substances Database (HSDB) 1999). Remobilization or desorption is less likely to occur when the Cd is associated with carbonates of hydrous oxides than when adsorbed to clay minerals or organic material.

Cadmium enters surface water from atmospheric deposition, runoff, or wastewater. Discharges of Cd to water are primarily associated with nonferrous mining and production where effluents are produced from site drainage and processes such as gas scrubbing. Cadmium is always found as Cd (II) in water; redox potential has little effect on valency. In natural waters, Cd can be found in several chemical forms; as a divalent (Cr^{+2}) species or its hydrates, as metal-organic complexes, or as metal-inorganic complexes. It may occur in dissolved, colloidal, or particulate form. In freshwater, the most important inorganic complexes are with hydroxide and bicarbonate. Studies of the speciation of Cd in natural waters indicate humic substances account for most of the complexing, followed in importance by carbonates (Callahan 1979). Hardness and pH have no significant effect on Cd-inorganic interaction, but have a pronounced effect on interactions with humic material. No evidence has been found that photolysis is an important mechanism determining the fate of Cd in aquatic systems. Cadmium does not form volatile compounds in the aquatic environment; therefore, volatilization from water is not a significant fate process (Callahan 1979).

Releases of Cd to sediment are primarily associated with releases to water. After Cd enters surface water, it is rapidly adsorbed onto particulate matter and settles out. Studies generally find that the sediment Cd concentration is at least an order of magnitude higher than concentration in the overlying water (Callahan 1979). Fractionation studies have shown that the dominant fraction of Cd in anaerobic sediment is a nonresidual sulfitic one, which is less bioavailable (Kersten and Forstner 1987). Remobilization of Cd may occur when anoxic sediment is exposed to an oxidizing environment.

In aquatic systems, Cd is primarily taken up by organisms directly from the water, but it may also be accumulated from contaminated food items. Organic matter in water generally decreases uptake of Cd by organisms by binding Cd and reducing its availability. The free metal ion (Cd^{2+}) is the form most available to aquatic species (Sunda et al. 1978; Borgmann 1983; Sprague 1985). Uptake from water may be reduced by high concentrations of calcium (Ca) and magnesium (Mg) salts. Presence of sediment limits the availability of Cd to aquatic invertebrates (Hardy *et al.* 1981; Ray *et al.* 1980).

Cadmium in soil is distributed between a number of pools or fractions, of which only the soluble Cd is thought to be directly available for uptake by plants (Dobson 1992). Soil pH is the primary factor determining the concentration of Cd in the solution; plant uptake of Cd decreases as soil pH increases. Other factors which influence the concentration of Cd in the soil solution include: soil composition (particularly the nature of the soil clays); organic matter content; and soil Cd concentration.

Cadmium is readily accumulated by many organisms, particularly by microorganisms, molluscs, and soil invertebrates. Most other organisms show low to moderate concentration factors of less than 100 (Dobson 1992). Cadmium is the only metal that clearly accumulates with increasing age of an organism, and the kidneys are the primary site of Cd accumulation (Wren *et al*. 1995). Most of the Cd found in animal tissue is probably bound to protein molecules.

Bioconcentration factors reported for Cd in various taxa are (taxa, BCF on a wet weight basis): freshwater plants, 1,000; freshwater invertebrates, 4,000; and freshwater fish, 3,000 (Callahan 1979). Cadmium is taken in by fish from both the water and through the diet. Most studies have shown that water is the primary source for uptake with diet playing an minor role (McCracken 1987).

The primary source of Cd in terrestrial systems is the soil, and uptake follows the typical food chain pathway. Organisms that feed on soil or detritus may accumulate more Cd than those in the grazing food chain. There is some evidence for biomagnification of Cd in carnivores (Dobson 1992).

Cadmium is a mutagen, teratogen, and a suspected carcinogen (RTECS 1991). Tissue levels of Cd increase with the age of an organism and eventually act as a cumulative poison (Hammons *et al*. 1978). Cadmium replaces essential metals (e.g., Zn) at critical sites on proteins and enzymes, and may inhibit a variety of enzymatic reactions. It inhibits Phase I and Phase II biotransformation reactions, probably by alteration of the enzymes responsible for these reactions (Sipes and Gandolfi 1986). Cytochrome P-450 monoxygenases play a major role in Phase I reactions. Cadmium also combines with sulfhydryl groups in enzymes, which affects the transfer of electrons from compounds in the citric acid cycle to compounds in the electron transport chain. Cadmium can inhibit ATP activity in the following ways: 1) it binds to and inactivates enzymes that synthesize ATP, and 2) it binds to ATPase, which is required to convert adenosine diphosphate and phosphate. (Hammons *et al*. 1978).

Borgmann, U. 1983. Metal speciation and toxicity of free metal ions to aquatic biota. Aquatic Toxicology. J. O. Nriagu. New York, NY, John Wiley and Sons**:** 47-72.

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I.7 Chromium

Chromium (Cr) is widely distributed in the earth's crust and in undisturbed systems is more abundant than cobalt (Co), Cu, Zn, molybdenum (Mo), Pb, nickel (Ni), and Cd. Chromium in the form of trivalent chromium (Cr^{+3}) primarily occurs in nature as chromite with the formula (Fe, Mg)O(Cr, Al, $Fe)_2O_3$ and is essentially insoluble. Naturally occurring minerals of hexavalent chromium (Cr^{+6}) are very rare and found only in highly oxidizing environments at low concentrations. Most environmental concentrations of Cr^{+6} are the result of industrial and domestic emissions (Cary *et al*. 1977, NJ DEP 1995, Bodek *et al*. 1988, Faust and Aly 1981).

The average Cr concentration in the continental crust is 125 parts per million (ppm) and ranges between 80 to 200 ppm. Chromium occurs in soils at concentrations ranging from trace amounts to greater than 10,000 ppm. A geometric mean of Cr in soils in the United States was estimated to be

37 ppm. Higher concentrations of Cr can be found in ultramafic igneous rocks (1,000 – 3,400 ppm), in shales and clays (30 – 590 ppm), and in phosphorites (30 – 3,000 ppm) (Faust and Aly 1981).

Chromium can exist in oxidation states ranging from Cr^{-2} to Cr^{+6}, but it is most frequently converted to the relatively stable Cr^{+3} and Cr^{+6} oxidation states (Eisler 1986a). In both freshwater and marine systems, hydrolysis and precipitation are the most important processes that determine the fate and effects of Cr; whereas, adsorption and bioaccumulation are relatively minor. Precipitated Cr^{+3} hydroxides remain in sediments under aerobic conditions. However, under anoxic and low pH conditions, Cr^{+3} hydroxides may solubilize and remain as ionic Cr^{+3} unless oxidized to Cr^{+6} through mixing and aeration (Eisler 1986a). In soils, the solubility and bioavailability of Cr are governed by soil pH and organic complexing substances, although organic complexes play a more significant role (James and Bartlett 1983a, 1983b).

The trivalent state is the form usually found in biological materials. This form functions as an essential element in mammals by maintaining efficient glucose, lipid, and protein metabolism (Steven *et al*. 1976). Chromium is beneficial but not essential to higher plants (Eisler 1986a). The biomagnification and toxicity of Cr^{+3} is low relative to Cr^{+6} because of its low membrane permeability and its noncorrosivity. However, a large degree of accumulation by aquatic and terrestrial plants and animals in the lower trophic levels has been documented (Eisler 1986a), although the mechanism of accumulation remains largely unknown.

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Cary, E.E., W.H. Allaway, andO.E. Olson. 1977. Control of Chromium Concentrations in Food Plants. 2. Chemistry of Chromium in Soils and Its Availability to Plants. J. Agric Food Chem., Vol 25, No.2, pp 305-309.

Eisler, R. 1986a. "Chromium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review." U.S. Fish and Wildlife Service Biological Report, 85(1.86). 60 p.

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"Chromium Hazards to Fish, Wildlife, and Invertebrates: a Synoptic Review." *U.S. Fish and Wildlife Service Biological Report*, 85(1.86). 60p.

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I.8 Cobalt

Cobalt is widely distributed in nature and comprises 0.001 to 0.002% of the earth's crust. Based on its K_d (45 in Baes *et al*. 1984), Co would be expected to adhere to particulate matter. Most Co in water is precipitated or adsorbed onto suspended solids and sediments. Cobalt may bioaccumulate in plants and aquatic organisms (ATSDR 1992b; HSDB 1999).

Cobalt is relatively insoluble in water, but is soluble under acidic conditions (HSDB 1999). The speciation and subsequent transport of Co in water is affected by a number of factors including the presence of ligands, concentration of anions, and pH. Depending on the nature of the water, the amount of dissolved and suspended forms may vary substantially. Cobalt is not significantly adsorbed by organic materials (e.g., humic and fulvic materials) in water (ATSDR 1992).

The mobility of Co in soils is primarily regulated by pH, with increasing mobility as the pH decreases (HSDB 1999; ATSDR 1992). The mobility of Co also decreases as the availability of oxides (such as iron and manganese oxides), crystalline materials, and other adsorbents in soil decreases (ATSDR 1992).

Cobalt will be taken up by plants, but generally at concentrations less than the surrounding soil (Baes *et al*. 1994). In highly acidic soils, significantly higher than normal concentrations of Co have been found in plants. The translocation of Co from roots to above-ground parts of plants is not significant in most soils. The bioaccumulation factors (BAFs) for Co in marine and freshwater fish are 100 to 4,000 and 40 to 1,000, respectively, indicating some potential for bioaccumulation (ATSDR 1992b).

ATSDR (Agency for Toxic Substances and Disease Registry). 1992. *Toxicological Profile for Cobalt*. TP-91/10.

Baes, C.F. III., R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. *A review and analysis of parameters for assessing transport of environmentally released radionuclides through agriculture*. Oak Ridge National Laboratory Report ORNL-5786.

HSDB (Hazardous Substances Data Bank). 1999. National Library of Medicine, Bethesda, Maryland (CD-ROM version), MICROMEDEX, Inc., Englewood, Colorado (Edition expires [1999]).

I.9 Copper

Copper does not appear to have mutagenic properties, but is a teratogen (RTECS 1991) and a possible carcinogen (Venugopal and Luckey 1978). Copper is caustic, and acute toxicity is primarily related to this property (Hatch 1978).

Copper is an essential element for animals and is a component of many metalloenzymes and respiratory pigments (Demayo *et al.* 1982). It is also essential to Fe utilization and functions in enzymes for energy production, connective tissue formation, and pigmentation (Venugopal and Luckey 1978). Excess Cu ingestion leads to accumulation in tissues, especially in the liver. High levels of Cu modify hepatic metabolism (Brooks 1988), which may lead to inability of the liver to store and excrete additional Cu. When liver concentration exceeds a certain level, the metal is released into the blood, causing hemolysis and jaundice. High Cu levels also inhibit essential metabolic enzymes (Demayo *et al*. 1982). Toxic symptoms appear when the liver accumulates three to 15 times the normal level of Cu (Demayo *et al.* 1982).

Although the exact mechanism of toxicity is not known, the following mechanisms have been proposed: Formation of stable inhibitory complexes with cytochrome P-450 (Wiebel *et al.* 1971); impairment of function of NADPH-cytochrome c reductase and alteration of mixed function oxidations (Reiners *et al.* 1986); and inhibition of heme biosynthesis (Martell 1981). Intranuclear inclusions may act as a detoxifying mechanism where Cu is complexed by protein ligands, protecting cytoplasmic organelles (Demayo *et al.* 1982).

Brooks, L. 1988. "Inhibition of NADPH-cytochrome c reductase and attenuation of acute diethylnitrosamine hepatotoxicity by copper." Ph.D. Dissertation, Rutgers University, New Brunswick, N.J.

Demayo, A., M.C. Taylor and K.W. Taylor. 1982. Effects of copper on humans, laboratory and farm animals, terrestrial plants and aquatic life. *CRC Critical Reviews in Environmental Control.* 12(3):183-255.

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Martell, A.E. 1981. Chemistry and Metabolism of Metals Relevant to their Carcinogenicity. *Environmental Health Perspectives,* 40:27-34.

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RTECS (Registry of Toxic Effects of Chemical Substances) Database. 1991. Published by the National Institute for Occupational Safety and Health (NIOSH).

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I.10 Iron

Iron is commonly detected at concentrations of 5 % or more in soil. It is used primarily in the production of steel and other alloys. Iron is a constituent of hemoglobin and is essential to plant and animal life as well as being an important component in cellular oxidative processes. The disposition of ingested Fe is regulated by a complex mechanism that maintains homeostasis. Therefore, bioconcentration in biota is not expected to be a significant process for Fe. Generally, about 2 to 15 % of ingested Fe is absorbed from the gastrointestinal tract, and elimination is approximately 0.01 % of the body burden per day. Adverse effects of Fe toxicity may include renal failure and hepatic cirrhosis. The mechanism of toxicity begins with acute mucosal cell damage and absorption of ferrous ions directly into circulation, resulting in capillary endothelial cell damage to the liver (Shacklette and Boerngen 1984).

Shacklette, H.T. and J.G. Boerngen. 1984. *Element Concentrations in Soils and other Surficial Materials of the Conterminous United States.* Alexandria, VA: USGS. 105p.

I.11 Lead

Lead does not biomagnify to a great extent in food chains, although accumulation by plants and animals has been extensively documented (Wixson and Davis 1993, Eisler 1988b). Older organisms typically contain the highest tissue Pb concentrations, with the majority of the accumulation in the bony tissues of vertebrates (Eisler 1988b).

Predicting the accumulation and toxicity of Pb is difficult since its effects are influenced to a very large degree, relative to other metals, by interactions among physical, chemical, and biological variables. In general, organolead compounds are more toxic than inorganic Pb compounds, and young, immature organisms are most susceptible to its effects (Eisler 1988b). In plants, Pb inhibits growth by reducing photosynthetic activity, mitosis, and water absorption. The mechanism by which photosynthetic activity is reduced is attributed to the blocking of sulfhydryl groups, inhibiting the conversion of coproporphyrinogen to proporphyrinogen (Holl and Hampp 1975).

The toxic effects of Pb on aquatic and terrestrial organisms are varied and include mortality, reduced growth and reproductive output, blood chemistry alterations, lesions, and behavioral changes. However, many effects exhibit trends in their toxic mechanism. Generally, Pb inhibits the formation of heme, adversely affects blood chemistry, and accumulates at hematopoietic organs (Eisler 1988b). At high concentrations near levels causing mortality, marked changes to the central nervous system occur prior to death (Eisler 1988b).

Plants can uptake Pb through surface deposition in rain, dust, and soil, or through the roots. The ability of a plant to uptake Pb from soils is inversely related to soil pH and organic matter content. Lead can inhibit photosynthesis, plant growth, and water absorption.

Eisler, R. 1988b. *Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. U.S. Fish and Wildlife Service Biological Report, 85(1.14). 134p.

Holl, W. and R. Hampp. 1975. Lead and Plants. *Residue Rev.*, 54:79-111.

Wixson, B.G. and B.E. Davis. 1993. Lead in Soil. Lead in Soil Task Force, Science Reviews, Northwood. 132pp.

I.12 Magnesium

Magnesium does not exist in a pure state in nature but is generally found in one of the following forms: dolomite, magnesite, brucite, periclase, carnallite, and kiersite. It is present in the earth's crust at about 2.1 % by weight and thus is one of the most common elements in the earth's crust. In addition, it is found as a silicate in asbestos and talc and is widely distributed. Magnesium is used for a variety of purposes, as a constituent in light alloys, in the manufacturing of precision instruments, in pyrotechnics, for flash bulbs and flares, for grignard reagents, in the recovery of titanium, as an antiknock additive in gasoline, in batteries, and in many other applications (HSDB 1999).

Magnesium is an essential nutrient at low doses, and is therefore highly regulated in organisms. However, Mg can become toxic at very high doses. Hypermagnesemia may cause impairment of neuromuscular transmission and cardiac effects (HSDB 1999).

HSDB (Hazardous Substances Data Bank). 1999. National Library of Medicine, Bethesda, Maryland (CD-ROM version), MICROMEDEX, Inc., Englewood, Colorado (Edition expires [1999]).

I.13 Manganese

Manganese does not occur as a free metal in the environment but is a component of numerous minerals. Elemental Mn and inorganic Mn compounds have negligible vapor pressures, but may exist in air as suspended particulate matter derived from industrial emissions or the erosion of soil. Removal from the atmosphere is mostly through gravitational settling. The transport and partitioning of Mn in water are controlled by the solubility of the specific chemical form present. The metal may exist in water in any of four oxidation states; Mn^{2+}, Mn^{3+}, Mn^{4+}, and Mn^{7+}. Divalent manganese (Mn^{+2}) predominates in most waters (pH 4 to 7), but may become oxidized at a pH greater than 8 or 9. Manganese is often transported in moving water adsorbed to suspended sediment. The tendency of soluble Mn compounds to adsorb to soils and sediments depends mainly on the CEC. The CEC is related to a soil's organic content and texture; CEC increases with organic matter content, increasing pH, and in finer textured soils. Adsorption of Mn and other metals to soil colloid particles increases with increasing CEC. Manganese in water may be significantly bioconcentrated at lower trophic levels. However, biomagnification in the food chain may not be significant (ATSDR 1990b).

ATSDR (Agency for Toxic Substances and Disease Registry). 1990b. *Toxicological Profile for Manganese.* Report prepared by the Research Triangle Institute for the U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

I.14 Mercury

Mercury (Hg) may be present in the environment in a number of forms. Mercury can exist in three oxidation states: elemental mercury (Hg^0), mercurous ion (Hg_2^{2+}), and mercuric ion (Hg^{2+}). The mercuric ion is the most toxic inorganic chemical form (Clarkson and Marsh 1982). Methylmercury

(MeHg) is the most hazardous form of Hg due to its high stability, lipid solubility, and the ability to penetrate membranes in living organisms (Beijer and Jernalov 1979). Methylmercury is the most toxic and bioavailable form of Hg, and is known to biomagnify in food chains. Mercury can become methylated biologically or chemically. Microbial methylation of Hg occurs most rapidly under anaerobic conditions, common in wetlands and aquatic sediments. The majority of Hg detected in biological tissues is present in the form of MeHg (Huckabee *et al.* 1979).

Mercury in soils is generally not available for uptake by plants, due to the high binding capacity to clays and other charged particles (Beauford *et al.* 1977). Mercury levels in plant tissues increase as soil levels increase; however, 95 % of the accumulation and retention of Hg is in the root system (Beauford *et al.* 1977, Cocking *et al.* 1991).

Mercury has no known biological function, and its presence in biological systems appears to result in undesirable effects. A number of toxic responses have been reported for Hg exposure. Eisler (1987) reports that juvenile life stages are most susceptible to acute effects of Hg exposure. In fish, acute exposure results in impaired respiration, sluggishness, and loss of equilibrium (Armstrong 1979).

Mercury is a potent neurotoxin, resulting in impaired muscular coordination, weight loss, and apathy in birds, mammals, and fish (Eisler 1987). Other reported effects include histopathological changes, changes in enzyme activity levels, mutagenicity, teratogenicity, and reproductive impairment.

All Hg compounds interfere with thiol metabolism in organisms, causing inhibition or inactivation of proteins containing thiol ligands and ultimately leading to mitotic disturbances (Das *et al.* 1982, Elhassani 1983). Mercury also binds strongly with sulfhydryl groups. Phenyl- and MeHG compounds are among the strongest known inhibitors of cell division (Birge *et al.* 1977). In mammals, MeHg irreversibly destroys the neurons of the central nervous system.

For all organisms tested, early developmental stages were the most sensitive to toxic effects of Hg. Organomercury compounds, especially MeHg, were more toxic than inorganic forms. In aquatic organisms, Hg adversely affects reproduction, growth, behavior, osmoregulation and oxygen exchange. At comparatively low concentrations in birds and mammals, Hg adversely affects growth and development, behavior, motor coordination, vision, hearing, histology, and metabolism. In mammals, the fetus is the most sensitive life stage (Eisler 1987).

Armstrong, F.A.J. 1979. Effects of mercury compounds in fish. In: *The Biogeochemistry of Mercury in the Environment.* Ed. J.O. Nriagu. New York, NY: Elsevier/North-Holland Biomedical Press. p. 657-670.

Beauford, W. J. Barber and A.R. Barringer. 1977. Uptake and distribution of mercury within higher plants. *Physiol Plant.*, 39:261-265.

Beijer, K. and A. Jernelov. 1979. Methylation of mercury in natural waters. In: *The Biogeochemistry of Mercury in the Environment*. Ed. J.O. Nriagu. New York: Elsevier/North-Holland Biomedical Press. p. 201-210.

Birge, W.J., J.A. Black, A.G. Westerman, P.C. Francis, and J.E. Hudson. 1977. Embryopathic effects of waterborne and sediment-accumulated cadmium, mercury and zinc on reproduction and survival of fish and amphibian populations in Kentucky. University of Kentucky, Water Resources Research Institute, Lexington, KY. Report No. 100.

Clarkson, T.W. and D.O. Marsh. 1982. Mercury toxicity in man. In: *Clinical, Biochemical, and Nutritional Aspects of Trace Elements. Vol. 6*. Ed. A.S. Prasad. New York, NY: Alan R. Liss, Inc. p. 549-568.

Cocking, D. R. Hayes, M.L. King, M.J. Rohrer, R. Thomas and D. Ward. 1991. Compartmentalization of mercury in biotic components of terrestrial floodplain ecosystems adjacent to the South River at Waynesboro, VA. *Water, Air and Soil Pollution*, 57-58:159-170.

Das, S. K., A. Sharma, et al. (1982). "Effects of mercury on cellular systems in mammals -- A review." Nucleus (Calcutta) **25**: 193-230.

Eisler, R. 1987. *Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. U.S. Fish and Wildlife Service Biological Report, 85(1.10). 90 p.

Elhassani, S. B. (1983). "The many faces of methylmercury poisoning." J. Toxicol. **19**: 875-906.
Huckabee, J.W., J.M. Elwood, and S.G. Hildebrand. 1979. Accumulation of mercury in freshwater biota. In: *The Biogeochemistry of Mercury in the Environment*. Ed. J.O. Nriagu. New York, NY: Elsevier/North-Holland Biomedical Press. p. 277-302.

Jernelov, A., A.H. Johansson, L. Sorenson and A. Svenson. 1976. Methylmercury degradation in mink. *Toxicology*. 6:315-321.

I.15 Nickel

Pure Ni is a hard, white metal that is used in the formation of alloys (such as stainless steel), and it is found in all soils. Nickel is the twenty-fourth most abundant element and is found in the environment as oxides or sulfides. It may be released into the environment through mining, oil-burning power plants, coal-burning power plants, and incinerators. Nickel will attach to soil or sediment particles, especially those containing Fe or Mn. Under acidic conditions, Ni may become more mobile and seep into the groundwater. The typical Ni concentration reported in soils is from 4 to 80 milligram per kilogram (mg/kg). The speciation and physicochemical state of Ni is important in considering its behavior in the environment and its availability to biota (ATSDR 1996).

ATSDR (Agency for Toxic Substances and Disease Registry). 1996. *Toxicological Profile for Nickel*. Report prepared by the Research Triangle Institute for the U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

I.16 Silver

Silver (Ag) is a rare element, but occurs naturally in the environment. Silver is used to make jewelry, silverware, electronic equipment, and dental fillings. Photographic materials are the primary source of Ag release into the environment. Other sources include mining operations and the natural weathering of Ag-bearing rocks and soil by wind and rain. Silver that is released into the environment may be carried long distances in air and water. Rain can wash Ag compounds out of the soil and into the groundwater. Silver does remain stable in the environment in various forms. It does not break down and can change its form by combining with other substances.

Silver concentrations in natural waters are usually very low, and if acute toxicity is ameliorated, there lies a possibility for accumulation of the metal. In laboratory experiments, Ag was bioconcentrated to a degree by all trophic levels tested. The BCFs for the aquatic organisms tested were *Daphnia magna* (61.0) > *Lemna gibba* (25.4) > *Selenastrum capricornutum* (4.8) > *Lepomis macrochirus*, internal organs (0.06) > *L. macrochirus*, gills (0.03). Significant Ag concentrations were not transferred to higher trophic levels in any of these experiments. These data suggest that the chance for biomagnification of Ag in aquatic systems is small (Forsythe 1996).

No information on the bioavailability or bioconcentration of Ag in terrestrial systems could be found at the writing of this report.

Forsythe, B.L. II. 1996. " Silver in a freshwater ecosystem: acute toxicity and trophic transfer." Ph.D. Dissertation, Clemson University, North Carolina

I.17 Selenium

Selenium (Se) chemistry is complex, existing as six stable isotopes of varying allopatric forms and valence states. Of these isotopes, Se-80 and Se-78 are the most common. Soluble selenates (+6) occur in alkaline soil and are slowly reduced to selenites (+4) which are readily taken up by plants. In acid or neutral soils, the amount of biologically available Se should steadily decline. Selenium volatilizes from soils at rates that are modified by temperature, moisture, time, season, concentration of water-soluble Se, and microbiological activity (Eisler 1985).

Concentrations of Se in water are largely a function of Se levels in drainage systems and of water pH. High Se levels tend to be associated with high water pH. Selenates represent the dominant species in drinking water. In seawater, selenites are the dominant species under some conditions. Selenites are less soluble than selenates and are easily reduced to elemental Se. Elemental Se is insoluble and largely unavailable although it is capable of satisfying nutritional Se requirements (Eisler 1985).

Selenium is an essential nutrient for some plants and animals, constituting an integral part of the enzyme glutathione peroxidase, and may have a role in other compounds such as vitamin E and the enzyme formic dehydrogenase as well. Selenium also forms part of certain proteins, including cytochrome C, hemoglobin, myoglobin, myosin, and various ribonucleoproteins. In many systems, Se deficiency is a larger problem than Se toxicity (Eisler 1985).

Selenium accumulation in certain species of plants may be extremely high. Consumption of Se-accumulating plants by livestock has induced illness and death. Plants that accumulate Se tend to be more deep-rooted than grasses; thereby, surviving aridity and remaining as the principal forage for herbivorous animals under dry conditions. Concentration of Se in animals tends to be higher in older than in younger individuals. In livestock, Se is distributed by the circulatory system to all body organs. Concentrations tend to be highest in the liver, blood, kidney, spleen, and brain, and lowest in muscle, skin, hair, and bone. Elimination is primarily by urine, and smaller amounts are excreted with feces, breath, perspiration, and bile (Eisler 1985).

Sublethal effects of elevated levels of Se in diet or water are associated with reproductive abnormalities, congenital malformations, selective bioaccumulation, growth retardation, chromosomal aberrations, intestinal lesions, shifts in community composition, and behavioral modifications (Eisler 1985).

Eisler, R. 1985. Selenium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. *U.S. Fish and Wildlife Service Biological Report*, 85(1.5). 57 p.

I.18 Thallium

Thallium (Tl) is one of the most toxic heavy metals. It is distributed widely but it is generally present in very low concentrations. Metallic Tl is soft and malleable, similar to Pb in both appearance and physical properties. Freshly-prepared Tl oxidizes rapidly. A hydroxide is formed in the presence of water. Inorganic Tl (I) compounds are more stable than the Tl (III) analogues in aqueous solution at neutral pH. In contrast, covalent organothallium compounds are stable only in the trivalent form (Mulkey and Oehme 1993). No information regarding the bioavailability or bioconcentration of Tl in aquatic or terrestrial systems could be found at the writing of this report.

Mulkey , J.P. and F.W. Oehme. 1993. “A Review of Thallium Toxicity.” Vet. Human Toxicol. 35(5):445-453.

I.19 Uranium

Uranium (U) is a naturally occurring element that makes up approximately 2 to 4 ppm of the earth’s crust. It is an actinide element, with the highest atomic mass of any naturally occurring element. In nature, crustal U occurs as a component of several minerals, such as carnotite, uraninite, and pitchblend, but it is not found in the metallic state.

The main industrial use for U is as fuel in nuclear energy plants. Uranium metal has commercial and industrial uses due to its density and strength. Products that use U include gyroscopic wheels in guidance systems, helicopter rotor blade counterbalances, and weights in airplane control surfaces. Uranium compounds are also used as catalysts and staining pigments.

Uranium can be redistributed in the environment by both natural and anthropogenic processes. The three primary processes that cause this redistribution are operations associated with the production of nuclear fuel, including the mining, milling, and processing of U ores or U end products; the production of phosphate fertilizers for which the phosphorus (P) is extracted from rocks containing

U; and the disposal of U mine tailings. Uranium redistribution by natural processes includes movement of U-containing soils through wind or water erosion or volcanic eruptions.

Uranium is released to the atmosphere primarily by resuspension of soil. Deposition of airborne U may occur by wet or dry processes. The rate of deposition is dependant on factors such as particle size, density, particle concentration, wind turbulence, and chemical form. Data are not available for residence time in the atmosphere for U, but it is assumed U will behave like atmospheric dust (ATSDR 1999).

Uranium deposited to soil can become reincorporated into soil, erode to surface waters, be transported to groundwater, or be deposited on or adsorbed onto plant roots. The mobility of U is increased under conditions that increase the rate of formation of soluble complexes or that decrease the rate of sorption to soil. Significant reactions of U in soil are formation of complexes with anions or ligands (e.g., CO_3^{-2}, OH^{-1}) or humic acid, and the reduction of U^{+6} to U^{+4}. The primary abiotic and biological processes that transform U in soil are oxidation-reduction reactions that convert hexavalent U (U^{+6}) (soluble) to tetravalent U (U^{+4}) (insoluble). Other factors that affect the mobility of U are soil pH, and the sorbing characteristics of the soil (Swanson 1985; Herczeg et al. 1988; Premuzie et al. 1995). Retention of U by soil may be due to adsorption, chemisorption, ion exchange, or a combination of these mechanisms. Sorption of U is highest in soils containing clay and iron oxide; geological materials such as silica, shale and granite have poor sorption characteristics (Ticknor 1994).

Uranium in surface water can be transported over large distances. Transport and dispersion of U in surface and groundwater are affected by adsorption and desorption on sediment and suspended particles. Factors that affect the mobility of U are oxidation-reduction potential, soil pH, and the sorbing characteristics of sediment and suspended particles (Swanson 1985; Herczeg et al. 1988; Premuzie et al. 1995).

In most surface water bodies, sediment acts as a sink for U and sediment concentrations are several orders of magnitude higher than concentrations in corresponding surface waters (Swanson 1985). Inorganic or organic ligands that can form soluble complexes with U will result in mobilization of the U. Uranium can undergo oxidation-reduction reactions in the environment or microbial interactions to form complexes with organic matter (Premuzie et al. 1995).

Natural U is a mixture of three isotopes: U-234, U-235 and U-238. All three isotopes behave the same chemically, but they have different radioactive properties. By weight, natural U is approximately 0.01% U-234, 0.72% U-235, and 99.27% U-238. One gram of natural U having this relative isotopic abundance has an activity of 0.67 microCurie (µCi). (A curie is the amount of radioactive material in which 1 billion atoms transform every second.) About 48.9% of the radioactivity is associated with U-234, 2.2% with U-235 and 48.9% with U-238 (ATSDR 1999). The activity of a given mass of U depends on the mass and half-life of each isotope present; the greater the relative abundance of the more rapidly decaying U-234 and U-235, the higher the activity will be (U.S. EPA 1991).

Uranium continuously undergoes transformation through a decay process whereby it releases energy to ultimately become a stable or nonradioactive element. There are two U isotope decay series. All natural U isotopes and some of their progeny decay by emission of alpha particles; the other members of both series decay by emission of beta particles and gamma rays (Cowart and Burnett 1994). U-238 is the parent of the U series (U-234 is a decay product of U-238), and U-235 is the parent of the actinide series. These two decay series have three features in common. Each series begins with a long-lived parent (half-lives for U-238 and U-235 are 4.5 billion and 710 million years, respectively), each series contains an isotope of the noble gas radon, and each series ends with a stable isotope of Pb (^{207}Pb or ^{206}Pb). The only mechanism for decreasing the radioactivity of U is radioactive decay.

The natural weight and activity ratios of U can be altered when in contact with water, or by processing U for industrial or governmental use. If the fraction of U-235 is increased, it is known as enriched U. When the portion of U-235 is decreased, it is called depleted U. Depleted U is less radioactive than natural U. Natural and depleted U are more likely to be chemical hazards than radioactive hazards (ATSDR 1999).

All U isotopes found in nature are radioactive. Toxicity from U exposure occurs by radiological damage and/or chemical toxicity. The hazards associated with U are dependent upon the chemical and physical form, route of intake, and level of enrichment. Chemical form affects solubility, transportability in body fluids, and retention in the body and various organs. Kidney and bone tissues are the main targets of both radiation and chemical toxicity of U in vertebrates. Of these two, kidney tissue is the most sensitive (Driver 1994).

Uranium emits alpha particles, and does not constitute an external radiation hazard. If ingested or inhaled, health effects of internal alpha emission in biota can be significant (Driver 1994). Retention time in the body is an important factor for the radiological damage. Enriched and insoluble U compounds can be retained in the lungs and associated lymphatics for long periods of time.

Chemical toxicity results from exposure to soluble U compounds, and results in renal damage. As a chemical, U tends to be fairly toxic on an acute basis (Lewis 1993). The critical organ for chemical toxicity is the proximal tubule of the kidney (Berlin and Rudell 1986). Nephritis is the primary chemically-induced health effect of U in animals following acute exposure (Paternian et al. 1989). The critical target organ for chronic exposure is the skeletal system (Adams and Spoor 1974; Guglielmotti et al. 1984).

Uranium is commonly found as the uranyl ion (UO_2^{2+}) in nature. In biological systems, U occurs in soluble form only in a U^{+4} or U^{+6} state as uranyl ions (Cothern and Lappenbusch 1983; Berlin and Rudell 1986; La Touche et al. 1987). Upon entering the body, soluble U immediately forms complexes with anions (Berlin and Rudell 1986). Oxidation of U^{+4} to U^{+6} is likely to occur in the organism.

Hexavalent U is rapidly excreted by the kidney. Seventy to 85% of U^{+6} absorbed is rapidly excreted in the urine, and less than 1% in the feces (Hursh and Spoor 1973; Priest et al. 1982). Approximately 12% to 20% of the absorbed U is retained in the kidney with a retention half-life of six days (Adams and Spoor 1974; International Commission of Radiological Protection (ICRP) 1979). Another 0.5 to 20% of the absorbed dose is deposited in the skeleton with a half-life of about 1,500 days (International Commission of Radiological Protection (ICRP) 1979).

Uranium does not biomagnify; levels in aquatic organisms decline with each successive trophic level due to low assimilation efficiencies in higher organisms. Bioconcentration factors reported for fish are low (Poston 1982; Waite et al. 1988); direct contact with water and accumulation of U on gill surfaces are thought to be more important than ingestion of contaminated food. The highest BAFs reported for rainbow trout (*Onchorhynchus mykiss*), white and finescale suckers (*Castastomus catactomus*) and lake whitefish (*C. clupeaformis*) did not exceed a value of 38 (Poston 1982; Swanson 1985).

In plants, uptake of U is restricted to the root system and may represent adsorption to the outer root membrane (Sheppard et al. 1983). Significant translocation of U from soil to aboveground plant parts has not been observed.

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ATSDR. 1999. Toxicological Profile for Uranium (update). U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry. 398 pp.

Berlin, M. and B. Rudell (1986). Uranium. Handbook on the Toxicology of Metals, 2nd Edition. Volume II: Specific Metals. L. Friberg, G. F. Nordberg and V. B. Vouk. New York, NY, Elsevier Science Publishers**:** 623-637.

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Cowart, J. B. and W. C. Burnett (1994). "The distribution of uranium and thorium-decay series radionuclides in the environment--A review." J. Environ. Qual. **23**: 651-662.

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Lewis, R. J. S. (1993). Hazardous Chemicals Desk Reference. 3rd Edition. New York, NY, Vos Nostrand Reinhold Publishers.

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Poston, T. M. (1982). "The bioaccumulation potential of thorium and uranium in rainbow trout (*Salmo gairdneri*)." Bull. Environ. Contam. Toxicol. **28**: 682-690.

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Priest, N. D., G. R. Howells, D. Green and J. W. Haines (1982). "Uranium in bone: Metabolic and autoradiographic studies in the rat." Human Toxicol. **1**: 97-114.

Sheppard, M. I., T. T. Vandergraaf and D. H. Thibault (1983). "Technetium and uranium: Sorption by and plant uptake from peat and sand." Health Phys. **44**: 635-644.

Swanson, S. M. (1985). "Food-chain transfer of U-series radionuclides in northern Saskatchewan aquatic system." Health Phys. **49**: 747-770.

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I.20 Vanadium

Elemental vanadium (V) does not occur naturally but can exist in 50 different ores and fossil fuels. Other anthropogenic sources include acid-mine leachate, sewage sludge, and fertilizers. The principal use of V is as an alloy constituent, especially in steel. The addition of V to steel removes oxygen (O_2) and nitrogen (N_2), which improves the strength. The average concentration of V in the earth's crust is 150 mg/kg and in the United States soils is 200 mg/kg (Byerrum *et al.* 1974).

The release of V to water and soil occurs as a result of the weathering of rocks and from soil erosion. This process usually converts the less-soluble trivalent form (V^{+3}) to the more-soluble pentavalent form (V^{+5}). The mobility of V in soil is affected by pH, redox potential, and the presence of particulates. Relative to other minerals, V is mobile in neutral or alkaline soils and its mobility decreases in acidic soils (ATSDR 1991b; Van Zinderen Bakker and Jaworski 1980).

In terrestrial systems, bioconcentration is more common in lower plant species. In addition, V concentrations in plants are dependent on the amount of water-soluble V, pH, and growing conditions. Vanadium appears to be present in all terrestrial mammals but the concentrations are usually below the detection limits. The highest concentration of V is usually found in the liver and skeletal tissues (ATSDR 1991b).

ATSDR (Agency for Toxic Substances and Disease Registry). 1991b. *Toxicological Profile for Vanadium.* U.S. Department of Health and Human Services. Prepared by Clement Associates, Inc. under contract No. 205-88-0608. Atlanta, GA.

Byerrum, R.U., R.E. Eckardt, and L.L. Hopkins. 1974. *Vanadium*. Washington D.C.: National Academy of Sciences.

Van Zinderen Bakker and J.F. Jaworski. 1980. *Effects of Vanadium in the Canadian Environment*. Ottawa, Canada: National Research Council of Canada, Associate Committee Scientific Criteria for Environmental Quality.

I.21 Zinc

Zinc occurs naturally in the earth's crust with an average concentration of 70 mg/kg. Zinc compounds are not found free in nature, but often occur in the +2 oxidation state as zinc sulfide, zinc carbonate or zinc oxide. The primary anthropogenic sources of Zn in the environment are from metal smelters or mining activities (HSBD 1999).

Zinc compounds are expected to exist in the particulate phase in the atmosphere, and be physically removed from the air by wet or dry deposition.

The Zn concentration of uncontaminated soils ranges from 10 to 300 mg/kg (ATSDR 1993). Zinc is strongly adsorbed to soil at pH 5 or greater, and Zn compounds have low mobility in most soils (Blume and Brummer 1991). Clay minerals, hydrous oxides, and pH are the most important factors controlling Zn solubility in soils. Soluble forms of Zn are readily absorbed by plants; normal Zn concentrations in plants range from 15 to 100 mg/kg (Kabata-Pendias and Pendias 1991; Thomas 1991). Volatilization from soil or water surfaces is not expected to be an important environmental fate process.

In surface waters, Zn can be found in several forms, including hydrated ions, metal-organic complexes or metal-inorganic complexes. Zinc is expected to adsorb to suspended solids in water and be transported to sediment (Callahan 1979).

Zinc is essential for normal growth and reproduction in plants and animals and is regulated by metallothioneins. Metallothioneins act as temporary Zn storage sites and aid in reducing the toxicity of Zn in both vertebrates and invertebrates (Olsson *et al*. 1989). Zinc is not known to bioaccumulate in food chains, because it is regulated by the body and excess Zn is eliminated.

Zinc has its primary metabolic effect on Zn-dependant enzymes that regulate the biosynthesis and catabolic rate of RNA and DNA. High levels of Zn induce Cu deficiency and interfere with metabolism of Ca and Fe (Goyer 1986). The pancreas and bone seem to be the primary targets of Zn toxicity in birds and mammals. Pancreatic effects include cytoplasmic vacuolation, cellular atrophy, and cell death (Lu and Combs 1988; Kazacos and Van Vleet 1989). Zinc preferentially accumulates in bone, and induces osteomalacia, a softening of bone caused by a deficiency of Ca, P and other minerals (Kaji *et al*. 1988). Gill epithelium is the primary target site in fish. Zinc toxicosis results in destruction of gill epithelium and tissue hypoxia (Spear 1981).

ATSDR. 1993. *Toxicological Profile for Zinc*. Report prepared by the Research Triangle Institute for the U.S. Departrment of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

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Kaji, T., R. Kawatani, M. Takata, T. Hoshino, T. Miyahara, H. Konzuka, and F. Koizumi. 1988. The Effects of Cadmium, Copper or Zinc on Formation of Embryonic Chick Bone in Tissue Culture. *Toxicology* 50:303-316. In: Eisler, R. 1993. *Zinc Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. U.S. Fish and Wildlife Service Report No. 26.

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Appendix J - Toxicity Profiles for Birds and Mammals
Midnite Mine Site
Final Report

Appendix J: Toxicity Profiles for Birds and Mammals

J.1 Derivation of Toxicity Reference Values

A toxicity reference value (TRV) is a contaminant dose level that is compared with a predicted exposure dose level, calculated based on site-specific data, to assess the presence and degree of risk to a receptor or group of receptors from that contaminant. A TRV is generally based on data from laboratory toxicological evaluations. Usually, two TRVs are used to predict ecological risk, a no observable adverse effect level (NOAEL) and a lowest observable adverse effect level (LOAEL). The NOAEL is the highest dose at which adverse effects are not expected to occur, and the LOAEL is the lowest dose at which adverse effects are expected to occur.

In order to derive TRVs, a comprehensive literature search was performed to identify studies on the toxicity of contaminants of concern (COCs) to ecological receptors. A variety of databases were searched, including Biological Abstracts, Applied Ecology Abstracts, Chemical Abstract Services, Medline, Toxline, BIOSIS, ENVIROLINE, Current Contents, Hazardous Substances Data Bank (HSDB), Registry of Toxic Effects of Chemical Substances (RTECS), Integrated Risk Information System (IRIS), and the Aquatic Toxicity Information Retrieval Database (AQUIRE).

In addition, a number of secondary literature sources provided summaries or reviews of toxicological literature related to a variety of contaminants. These documents were not used directly to derive TRVs because they do not capture the details of the toxicological methods needed for the selection of technically defensible TRVs. However, these summary documents provided an excellent source for locating original studies that may have been overlooked in the database searches. Examples of such summary documents include Agency for Toxic Substances and Disease Registry (ATSDR) documents, United States (U.S.) Fish and Wildlife Service Contaminant Hazard Reviews, U.S. Environmental Protection Agency (EPA) Great Lakes Water Quality Initiative documents, and U.S. EPA Ambient Water Quality Criteria documents.

Studies that were obviously not useful or appropriate for deriving a TRV were eliminated. A number of criteria were considered when evaluating the appropriateness of using a particular study for deriving a TRV. The most important consideration was the suitability of the test result for evaluating the assessment endpoint. A number of additional criteria were also considered. For example, studies were selected in which the test organism was in as similar a taxonomic grouping as possible to the measurement endpoint species. Exposure doses had to be quantified and effects measured and reported. The exposure duration was preferably either chronic, sub-chronic, or involved a sensitive life stage; multi generational studies were also appropriate. For laboratory studies, the likelihood that a similar result would be obtained if the test were repeated was an additional consideration. Sample sizes had to be adequate and the treatment groups must have been compared to appropriate control groups. At the very least, a negative control had to be included in the study design. In addition, the measured endpoints of the study had to be ecologically relevant. For the purposes of deriving a TRV for an ecological risk assessment, an ecologically relevant endpoint is one which is closely tied to the survival and viability of a population in the field. Usually, the endpoints measured for this purpose were survival, growth, and reproduction. In addition, appropriate statistical analyses must have been performed and the statistical significance reported. Finally, the study design preferably included at least three treatments in addition to any controls which may have been selected.

The selected TRVs were based preferably on high-quality studies which satisfy many or all of the above requirements. From these studies, the lowest concentration that was associated with adverse ecological effects on the test organism was selected as the LOAEL. Studies which reported both a LOAEL and NOAEL were selected over studies which reported only one effect level, due to the uncertainty associated with an unbounded effect level. If only a LOAEL could be identified from the studies, an uncertainty factor of 10 was used to calculate a NOAEL (Dourson and Stara 1983; U.S. EPA 1989; Sample *et al*. 1996; Amdur *et al*. 1996). If a LOAEL could not be located for a COC, a median lethal dose (LD_{50}) was selected; a factor of 10 was then used to calculate a LOAEL and a factor of 100 was used to calculate a NOAEL. Finally, if no adverse effect level could be located for a COC, the highest reported NOAEL was selected, and a factor of 10 was used to calculate a LOAEL. Professional judgement was used in some cases to select the most appropriate TRV.

The studies that were reviewed to derive toxicity reference values for this risk assessment are described below. Concentrations selected to be used as TRVs are summarized in Table 18.

Amdur, M.O., J. Doull, and C.D. Klaasen. 1996. *Casarett and Doull's Toxicology: The Basic Science of Poisons.* 5th Ed. New York: McGraw-Hill. p. 80-81.

Dourson, M.L. and J.F. Stara. 1983. Regulatory History and Experimental Support of Uncertainty (Safety) Factors. *Regulatory Toxicology and Pharmacology.* 3: 224-238.

Sample, B.E., D.M. Opresko, and G.W. Suter. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Prepared for the U.S. Department of Energy. ES/ER/TM-86/R3.

U.S. EPA (United States Environmental Protection Agency). 1989. *Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A). Interim Final.* Office of Emergency and Remedial Response. EPA/540/1-89/002.

J.2 Aluminum

J.2.1 Toxicity to Birds

Mallard ducklings were fed diets containing aluminum sulfate [0.1 or 0.5 percent (%) aluminum (Al) and 0.056 or 0.277 moles sulfate per kilogram (kg)], sulfuric acid (0.056 or 0.277 moles sulfate per kg), sodium sulfate (0.056 or 0.277 moles sulfate per kg), or a control diet for 15 days (Capdevielle and Scanes 1995). Growth, as indicated by body weight, average daily gain, and tibiotarsus length, was reduced in ducklings on the high Al diet as compared to those receiving the control diet. No effects on plasma concentrations of growth hormone, insulin-like growth factor-I, or insulin-like growth factor binding proteins was observed in ducklings fed any of the experimental diets. The authors concluded that Al influences growth in ducks by reducing food consumption. Mean body weight at the initiation of the study was 45.88 grams (g). Body weights at the end of the study were 201 g for the ducklings fed the high Al diet and 316 g for the low Al group. Daily food intake was 52.0 and 66.4 g for the two groups, respectively. A LOAEL of 1294 milligrams per kilogram body weight per day (mg/kgBW/day) and a NOAEL of 210 mg/kgBW/day were calculated based on the results of this experiment.

The effect of dietary aluminum sulfate on calcium (Ca) and phosphorus (P) metabolism was studied using one-day old broiler chicks (Hussein et al. 1990). Chicks were fed a control diet or diets containing varying amounts of Ca and P, and 0 or 0.392 % Al for 49 days. In general, Al significantly decreased body weight gain, feed intake, gain:feed ratio, plasma inorganic P, tibia breaking strength, tibia weight, and plasma zinc (Zn). A second experiment was conducted to determine whether the observed effects were due to the dietary Al or sulfate; chicks were fed a control diet, one supplemented with aluminum sulfate, or a diet supplemented with potassium sulfate. Pair-fed controls were also included. No effects were observed in the birds fed the potassium sulfate supplemented diet. Dietary Al significantly decreased weight gain, food intake, and plasma P. Pair-feeding the control diet decreased weight gain and food intake, but did not affect plasma P. The authors concluded the influence of Al on growth is due to reduced food intake, while altered Ca and P metabolism were attributed to the direct effects of Al. A food ingestion rate of 0.0573 kilograms per day (kg/day) and a body weight of 0.633 kg (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 355 mg/kgBW/day and an estimated NOAEL of 35.5 mg/kgBW/day were calculated based on the results of this experiment.

Ring doves were fed diets containing 1,000 mg/kg Al (93.8 mg/kgBW/day) as aluminum sulfate for four months (Carriere et al. 1986). Calcium and P levels in the diet were 0.9 and 0.5 %, respectively. No effects on egg production, fertility, hatchability or eggshell permeability were observed. An ingestion rate of 0.015 kg/day and adult body weight of 0.16 kg (Schwarzbach et al. 1991) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 93.8 mg/kgBW/day was observed in this experiment.

Day-old chicks were fed six different diets in which Al was combined with normal and low concentrations of dietary Ca and P for 14 days (Nybø 1996). The normal Ca-available P (Ca-P) level was 1.05% to 0.45%, and the low dietary Ca-P level was 0.49% to 0.21%. Aluminum was given at dietary concentrations of 0, 0.13 and 0.31 %. Aluminum at any concentration had no effect on growth, mortality or hematocrit, but it did affect bone development parameters (bone stiffness, strength, volume and Ca concentration) when Ca-P was low. A diet low in Ca and P may be encountered by birds that feed in acidified areas, as Ca rich food items (crustaceans, snails and molluscs) are very sensitive to low pH (Økland and Økland 1986) and acidified waters are often low in P (Olsson and Petterson 1993). Aluminum can be mobilized and become bioavailable under acidic conditions. Bone stiffness and strength influence the ability of bones to withstand external strain. Bone stiffness and bone volume were significantly lower in chicks fed the high Al diet than in control chicks. An ingestion rate of 0.0075 g/day and body weight of 0.066 g (U.S. EPA 1988; values cited for 7-day old chicks) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 352.2 mg/kgBW/day and a NOAEL of 147.7 mg/kgBW/day were calculated based on the results of this experiment.

Day-old chicks and day-old mallard ducks were fed diets containing Al (as aluminum sulfate) at concentrations of 0, 0.1 and 0.5 % for fifteen days (Capdevielle et al. 1998). Growth rate was reduced in chicks and ducks receiving the high Al diet. For both species, significant reductions in bone mineralization was observed in birds receiving the high Al diet as compared to control birds and pair-fed controls. Tibiae of birds on the high Al diet were soft, spongy, pliable and easily broken. Al directly adversely affected bone mineralization; changes were not due to reduced food consumption. For chicks, an ingestion rate of 0.0075 kg/day and body weight of 0.066 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. For ducks, an ingestion rate of 0.0147 kg/day and a body weight of 0.072 kg (Sugden et al. 1981) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 568.2 mg/kgBW/day and a NOAEL of 113.6 mg/kgBW/day were calculated for chicks. A LOAEL of 1,021 mg/kgBW/day and a NOAEL of 204 mg/kgBW/day were calculated for ducklings based on the results of this experiment.

One-day old mallard (M) and black ducks (BD) were fed diets comprised of one of three Ca:P regimens and four Al concentrations [200, 1,000, 5,000 and 10,000 milligrams per kilogram (mg/kg)] for 10 weeks (Sparling 1990). Forty-five % of the BDs died during the experiment, whereas only 28 % of the Ms died. Mortality was significantly related to diet for both species. Differences among treatments were due to both Ca:P and Al concentrations. High Al diets with low Ca and P were most toxic to ducklings. One hundred % mortality was observed for both species fed 5,000 mg/kg Al and low Ca:P. Many birds on the low Ca:P, 1,000 mg/kg Al diet demonstrated symptoms of rickets, had broken or dislocated legs, and some mortality was observed (73 % for BDs, 61 % for Ms). No adverse effects were observed in ducklings fed diets with normal Ca:P concentrations and 1,000 mg/kg Al. Birds fed diets containing normal Ca:P levels and 5,000 mg/kg Al experienced stunted growth and were less active and alert than the control groups. This dietary exposure regime was identified as the LOAEL for this experiment. Ingestion rates of 0.0689 (BD), 0.0759 (M), 0.0742 (BD)and 0.0718 (M) kg/day and body weights of 0.835, 0.974, 0.898 and 1.051 kg (for BDs and Ms consuming the normal Ca:P, 5,000 mg/kg Al diet, and the normal Ca:P, 1,000 mg/kg Al diets, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 412.6 mg/kgBW/day and a NOAEL of 82.6 mg/kgBW/day was calculated for BDs, while a LOAEL of 389.6 mg/kgBW/day and a NOAEL of 68.3 mg/kgBW/day was calculated for Ms. The normal diet containing 5,000 mg/kg Al was selected as the LOAEL TRV concentration; however, it should be noted that adverse effects from dietary Al could be expected at lower concentrations if the diet is deficient in Ca and P (adverse effects were observed at an exposure concentration of 1,000 mg/kg Al in low Ca:P diets in this experiment).

Japanese quail were fed diets containing 0, 0.05, 0.1 and 0.15 % Al (0, 500, 1,000 and 1,500 mg/kg, respectively) for four weeks (Hussein et al 1988). Addition of 0.1 and 0.15 % Al to the diet significantly reduced shell breaking strength of eggs sampled days 8 to 12, but not of those sampled days 13 to 22. For hens which consumed a diet containing 0.15 % Al, body weight and egg production were significantly decreased compared to control birds. An ingestion rate of 0.018 kg/day and a body weight of 0.12 kg (Varghese 2000) were used to convert the exposure concentrations to units of mg/kgBW/day, resulting in exposure concentrations of 0, 75, 150 and 225 mg/kg BW/day. A NOAEL of 150 mg/kg BW/day and a LOAEL of 225 mg/kg BW/day were calculated based on the results of this experiment

White Leghorn laying hens were fed diets containing 0, 0.05, 0.10 or 0.15 % Al for 28 days (Hussein et al. 1989). Food intake, egg production, body weight, tibia breaking strength and plasma inorganic P were significantly decreased in hens which consumed diets containing 0.15

% Al compared to control birds. Egg production and tibia breaking strength were considered ecologically relevant effects. Ingestion rates of 0.0773 and 0.0928 kg/day and body weights of 1.688 and 1.862 kg (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 68.7 mg/kgBW/day and a NOAEL of 49.8 mg/kgBW/day were identified from this experiment. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Al to avian receptors.

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J.2.2 Toxicity to Mammals

Toxicity of Al to rats was evaluated by exposing weanling Long-Evans rats to 5 mg/kg Al as potassium sulfate in drinking water for life (Schroeder and Mitchener 1975). No adverse effects were observed at this exposure concentration; effects measured included median life-span, longevity, incidence of tumors, serum cholesterol, glucose and uric acid. A water ingestion rate of 0.053 Liters per day (L/day) and body weight of 0.43 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 0.062 mg/kgBW/day was calculated based on the results of this experiment.

Dixon et al. (1979) conducted a study that evaluated the reproductive success of albino Sprague-Dawley rats exposed to Al in drinking water for 90 days prior to breeding. The highest dose administered was 500 parts per million (ppm) and did not result in reproductive abnormalities. An ingestion rate of 0.058 L/day and body weight of 0.48 kg (U.S.EPA 1988) were used to convert the exposure concentration, a NOAEL, to units of 60.4 mg/kgBW/day.

Mice were fed Al as aluminum lactate at concentrations of 25 (control), 500 or 1,000 mg/kg for 6 weeks (Golub et al. 1989). Neurotoxic signs were not observed in any group, however; the overall activity level was significantly lower in mice fed 1,000 mg/kg, with vertical movement more affected than horizontal movement. An ingestion rate of 0.0058 kg/day and body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 176 mg/kgBW/day and a NOAEL of 88 mg/kgBW/day were calculated based on the results of this experiment.

Swiss Webster mice received diets containing Al at concentrations of 7 (control), 500 or 1,000 mg/kg from conception through adulthood (Golub et al. 1993). Increased cage aggression and decreased performance on spatial alternation tasks were observed in the mice exposed to Al at a concentration of 1,000 mg/kg. An ingestion rate of 0.0058 kg/day and body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 176 mg/kgBW/day and a NOAEL of 88 mg/kg/day were calculated based on results of this experiment.

Several experiments were conducted to evaluate chronic toxicity of oral Al (Ondreicka et al. 1966). Mice were administered aluminum chloride in drinking water at a concentration of 0 or 19.3 mg/kgBW/day for three generations. No significant differences between number of litters or offspring were observed. Significant growth retardation was observed in the second and third generation offspring. In a second experiment, mice were fed diets containing Al at concentrations of 170 (control) and 355 mg/kg for 40 days. Phosphorus retention was significantly reduced in experimental mice; on some days, net excretion was observed. In addition to affecting absorption of P, a significant decrease in the adenosine triphosphate/adenosine diphosphate (ATP/ADP) ratio in the blood was observed. An ingestion rate of 0.0058 kg/day and body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 62.4 mg/kgBW/day and an estimated NOAEL of 6.24 mg/kgBW/day were calculated based on the results of the second experiment. Based on the growth retardation observed in offspring in the first experiment, a LOAEL of 19.3 mg/kgBW/day and an estimated NOAEL of 1.93 mg/kgBW/day were selected to evaluate the toxicity of Al to mammals. Based on the ecological significance of the endpoint (growth) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Al to mammalian receptors.

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J.3 Antimony

J.3.1 Toxicity to Birds

No studies were located that evaluated toxicity of antimony (Sb) to birds.

J.3.2 Toxicity to Mammals

Diets containing antimony trioxide were fed to male and female Wistar rats at concentrations of 0, 84, 421 and 1686 mg/kgBW/day for 90 days (Hext et al. 1999). No effects on growth, growth rate, food consumption or clinical signs were observed at any exposure dose. Minor changes in hematology and urine biochemistry were observed. The ecological significance of changes in blood chemistry is not known; therefore, this experiment was not used to derive a TRV for Sb.

Field voles (*Microtus agrestis*) were exposed to antimony trioxide in their diets at concentrations of 0, 500, or 6,700 mg/kg for 21 days, 0 or 500 mg/kg for 60 days, or 0 or 20,000 mg/kg for 12 days (Ainsworth et al. 1991). Dietary exposure to Sb produced elevated concentrations of Sb in liver, lung and kidney tissue; however, no histopathological changes were observed in liver or kidney tissue even at the highest exposure concentration. An equilibrium between uptake and excretion of Sb was rapidly established, and progressive increases in organ concentration as exposure duration increased were not observed. A NOAEL of 500 mg/kg was observed in this experiment.

Male Wistar rats were exposed to Sb in their diet at concentrations of 0, 0.1 and 1.0 % (wet weight) metal Sb and 1.0 % antimony trioxide for 12 weeks (Hiraoka 1986). Following exposure, rats were fed Sb-free diets for the following 12 weeks. Behavior and general appearance of the rats were not affected by exposure to Sb at any concentration tested in this experiment. Liver weights were significantly higher and heart weights were significantly lower in rats exposed to 1.0 % dietary Sb as compared to controls; however, heart and liver function were not measured. An ingestion rate of 0.027 kg/day and a body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to unit of mg/kgBW/day. A NOAEL of 771 mg/kgBW/day was calculated based on the results of this experiment.

Antimony trioxide in aqueous suspension was administered to male Swiss albino mice by gavage at concentrations of 0, 400, 666.7 and 1,000 mg/kgBW/day for 21 days (Gurnami et al. 1992). Mice of both sexes were exposed to three doses at the above concentrations to evaluate effects of acute exposure. Antimony did not induce chromosomal aberrations following single acute exposures. Following chronic exposure, the frequency of chromosomal aberrations increased proportionately with dose, and was significantly different from controls at all dose levels. The frequency of abnormal sperm did not differ between treated and control mice. The highest dose was lethal on day 20 of treatment. Based on the observed chromosomal aberrations, a LOAEL of 400 mg/kgBW/day and an estimated NOAEL of 40 mg/kgBW/day were identified from this experiment.

Mice were exposed to Sb (as antimony potassium tartrate) in drinking water at an exposure concentration of 5 mg/L throughout their lifespan (Schroeder et al. 1968). The endpoint measured was longevity. Median lifespan of female mice was significantly reduced as compared to control mice. A body weight of 0.033 kg and water ingestion rate of 0.008 L/day (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 1.21 mg/kgBW/day and an estimated NOAEL of 0.121 mg/kgBW/day were calculated based on the results of this experiment.

Long-Evans strain rats were exposed to Sb in drinking water at an exposure concentration of 5 mg/L throughout their lifespan (Schroeder et al. 1970). Serum cholesterol was abnormal in rats exposed to Sb, and nonfasting serum glucose levels were lower than fasting. Life span and longevity were significantly reduced in rats exposed to Sb as compared to control rats.

A body weight of 0.43 kg and a water ingestion rate of 0.053 L/day (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBWday. A LOAEL of 0.62mg/kgBW/day and an estimated NOAEL of 0.062 mg/kgBW/day will be used to evaluate risk to mammals from Sb for this risk assessment. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Sb to mammalian receptors.

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J.4 Arsenic

J.4.1 Toxicity to Birds

A single oral dose of an organoarsenical compound was used to develop an LD_{50} of 47.6 mg/kg BW/day for the California quail (Hudson et al. 1984) and 33 mg/kg BW/day for the chicken (NAS 1977).

Adult mallard ducks were exposed to four concentrations [0, 25, 100 and 400 mg sodium arsenate/kg diet; 51.35% arsenic (As)] for 115 to 128 days (Stanley et al. 1994). Ducklings were placed on the same diet as their parents for 14 days after hatching. At the levels tested in this experiment, dietary As did not affect hatching success or embryo deformities. Duckling production (number of ducklings alive at day 14 for nests producing more than one duckling) was significantly decreased in birds exposed to 400 mg/kg sodium arsenate (205.4 mg/kg As); this exposure concentration was identified as the LOAEL. An ingestion rate of 0.139 kg/day and adult body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the mg/kg diet concentrations to units of 5.7 mg/kgBW/day (NOAEL) and 22.8 mg/kgBW/day (LOAEL). Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by As to avian receptors.

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J.4.2 Toxicity to Mammals

The National Resources Council of Canada (1978) states that mammals in general have oral LD_{50} values ranging from 10 to 50 mg/kg of lead arsenate. A study conducted on mice indicated an oral dose LD_{50} of 39.4 mg/kgBW/day after 96 hours (NAS 1977). Toxicity was noted in a study using cats administered an oral dose of 1.5 mg/kg BW/day (Pershagen and Vahter 1979).

Mice were administered an oral dose of 5 ppm arsenite in drinking water for three generations (Schroeder and Mitchner 1971). No effects on number of litters, age at first litter, interval between litters, dead litters, offspring deaths or runts were observed. Average litter size was smaller and an increase in ratio of males to females were noted; no statistical analysis was conducted on these parameters. A water ingestion rate of 0.0075 L/day and adult body weight of 0.032 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 1.17 mg/kg BW/day and an estimated LOAEL of 11.7 mg/kg BW/day As were calculated based on the results of this experiment.

Dogs were fed diets containing sodium arsenite at concentrations of 0, 1, 2, and 4 mg/kgBW/day for 59 days (Neiger and Osweiller 1989). On day 59, the dosage was doubled for the rest of the experiment, which ended on Day 183. Significant dose-dependant decreases in food consumption and body weight were observed in dogs exposed to As at concentrations of 4 and 8 mg/kgBW/day. Weight loss was due to decreased food consumption, not to any direct effect of As. No gross or microscopic lesions were found in livers of any group. The effect concentrations observed in this experiment were not used to derive a TRV for this risk assessment, as a decrease in body weight is not considered an ecologically relevant effect.

Arsenic trioxide was administered to female rats (strain Crl:CD®(SD)BR) at concentrations of 0, 1, 2.5, 5 and 10 mg/kgBW/day in conformance with good laboratory practice (GLP) regulations (Stump et al. 1998). Arsenic exposure began 14 days prior to mating and continued until gestation day 19. Reduced body weight and food intake were observed in rats exposed at a concentration of 10 mg/kgBW/day; stomach abnormalities such as eroded areas and adhesions were also observed. Fetal weights were reduced and the incidence of two skeletal developmental variations were also increased in the high dose group. The fetal effects were attributed to the effect on fetal weight and were not indicative of teratogenicity. Other intrauterine parameters measured (numbers of corpora lutea, implantation sites, resorptions and viable fetuses) were not affected by treatment. Arsenic-related malformations were not observed at any exposure concentration.

Mice were fed diets containing As (as H_3AsO_4; 52.76% As) at concentrations of 0, 20, 100 or 500 mg/kg (As concentrations of 0, 10.55, 52.76 and 263.8 mg/kg, respectively) for two generations (Hazelton Laboratories 1990). Exposure started 14 weeks premating for the first generation and continued through weaning of pups from the F_1 females. At the highest exposure concentration, lower birth weights, postnatal growth retardation and increased postnatal mortality were observed. Dam survival and weight gain were also affected at this exposure concentration. Growth of second generation males and females was significantly reduced at an exposure concentration of 100 mg/kg. With the exception of a few weeks (66 weeks of food consumption measurements, total), food consumption did not differ significantly between the 20 and 100 mg/kg exposure groups and control animals. Body weights of 31.9 g and 33.72 g, and food ingestion rates of 5.82 g/day and 6.11 g/day (reported for the 100 mg/kg and 20 mg/kg exposure groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. Based on the observed growth effects, a LOAEL of 9.63 mg/kgBW/day and a NOAEL of 1.91mg/kgBW/day were identified. Based on the ecological significance of the endpoint (growth) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by As to mammalian receptors.

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J.5 Barium

J.5.1 Toxicity to Birds

One-day old chicks were exposed to barium hydroxide in their diet for four weeks; concentrations evaluated were 250, 500, 1,000, 2,000, 4,000, 8,000, 16,000 and 32,000 mg/kg (Johnson et al. 1960). No mortality was observed in birds exposed at dietary concentrations up to 2,000 mg/kg. Mortality was observed in all groups exposed to concentration of 4,000 mg/kg as barium (Ba) and higher. An ingestion rate of 0.0126 kg/day (calculated using allometric equation from U.S. EPA 1988) and body weight of 0.121 kg (U.S. EPA 1988) were used to convert the mg/kg diet concentrations to units of mg/kgBW/day[1]. A LOAEL of 416.5 mg/kgBW/day (4,000 mg/kg) and a NOAEL of 208.3 mg/kgBW/day (2,000 mg/kg) were calculated based on results of this experiment. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Ba to avian receptors.

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J.5.2 Toxicity to Mammals

Toxicity of Ba to rats was evaluated by exposing weanling Long-Evans rats to 5 mg/kg Ba as barium acetate in drinking water for life (Schroeder and Mitchener 1975). No adverse effects were observed at this exposure concentration; effects measured included median life-span, longevity, incidence of tumors, serum cholesterol, glucose and uric acid. Aslight enhancement of growth was observed. A water ingestion rate of 0.053 L/day and body weight of 0.43 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 0.062 mg/kgBW/day was calculated based on the results

[1] A mean body weight for 14-day old chicks and an estimated food consumption rate for two-week old chicks were used.

of this experiment.

Tardiff et al. (1980) exposed 4-week old Charles River rats to Ba (as barium chloride) in drinking water at concentrations of 0, 10, 50 or 250 mg/L (0, 1.9, 8.9, and 41.9 mg/kgBW/day, as reported by authors) for 13 weeks. Barium concentration in food was 6.6 micrograms per kilogram (µg/kg), Ba was not detectable in control water, and measured Ba concentrations in water solutions deviated less than 2 % of calculated concentrations. No effects on food consumption, body weight, hematologic parameters, serum ions, serum enzymes, gross pathology or histopathology were observed. The rats exposed to 250 mg/L consumed less water and had a significant decrease in relative adrenal weight when compared to control animals. Based on the lack of ecologically significant effects, the highest exposure dose tested in this experiment was considered a NOAEL (41.9 mg/kgBW/day) in deriving the TRV for Ba.

Perry et al. (1989) evaluated toxicity of Ba in drinking water to female Long-Evans rats exposed to concentrations of 0, 1, 10 or 100 mg/L for 16 months. Rats exposed to 100 mg/L Ba exhibited significant increases in systolic pressure, depressed rates of cardiac contraction, depressed electrical excitability, and lower ATP content in the heart. The ecological significance of the observed effects is not known; therefore, this dose was considered a NOAEL. A water ingestion rate of 0.022 L/day and body weight of 0.435 kg (Perry et al. 1983) were used to convert the exposure concentrations to units of mg/kgBW/day. An estimated LOAEL of 51 mg/kgBW/day and a NOAEL of 5.1 mg/kgBW/day will be used to evaluate risk from exposure to Ba for mammals.

Perry, H.M., E.F. Perry, M.N. Erlanger and S.J. Koop. 1983. Cardiovascular effects of chronic barium ingestion. In: Proc. 17th Ann. Conf. Trace Substances in Environ. Health, Vol. 17. U. of Missouri Press, Columbia, MO.

Perry, H.M. Jr., S.J. Koop, Perry, E.F. and M.W. Erlanger. 1989. Hypertension and associated cardiovascular abnormalities induced by chronic barium feeding. J. Toxicol. Environ. Health. 28:373-388.

Schroeder, H.A. and M. Mitchener. 1975. Life-term studies in rats: Effects of aluminum, barium, beryllium and tungsten. J. Nutr. 105:421-427.

Tardiff, T.G., M. Robinson and N.S. Ulmer. 1980. Subchronic oral toxicity of $BaCl_2$ in rats. J. Env. Path. Tox. 4:267-275.

J.6 Beryllium

J.6.1 Toxicity to Birds

No studies were located that evaluated dietary toxicity of beryllium (Be) to birds.

J.6.2 Toxicity to Mammals

Toxicity of Be to rats was evaluated by exposing weanling Long-Evans rats to 5 mg/kg Be as beryllium sulfate in drinking water for life (Schroeder and Mitchener 1975). No adverse effects were observed at this exposure concentration; effects measured included median life-span, longevity, incidence of tumors, serum cholesterol, glucose and uric acid. An ingestion rate of 0.053 L/day and adult body weight of 0.43 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day, resulting in a NOAEL of 0.62 mg/kgBW/day and an estimated LOAEL of 6.2 mg/kgBW/day; these values will be used to evaluate the risk of exposure to Be for mammalian receptors.

Schroeder, H.A. and M. Mitchener. 1975. Life-term studies in rats: Effects of aluminum, barium, beryllium and tungsten. J. Nutr. 105:421-427.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87/008.

J.7 Boron

J.7.1 Toxicity to Birds

Adult mallard ducks were fed diets supplemented with 0, 30, 300 or 1,000 mg/kg boron (B) (Smith and Anders 1989). Hatching success of fertile eggs was significantly decreased for birds fed B at a concentration of 1,000 mg/kg. Hatching weight, duckling survival, and duckling weight gain were also reduced at this exposure concentration. Boron did not affect adult survival or egg fertility. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg were used to convert the exposure concentrations to units of mg/kgBW/day (Piccirillo and Quesenberry 1980). A LOAEL of 111.2 mg/kgBW/day and a NOAEL of 33.36 mg/kgBW/day were calculated based on the results of this experiment.

Breeding mallards were fed diets supplemented with B (as boric acid) at 0, 450 or 900 mg/kg in combination with selenium (Se) (as seleno-DL-methionine) at 0, 3.5 or 7 mg/kg in a replicated factorial experiment from 3 weeks prior to mating until ducklings were 14 days old (Stanley et al. 1996). Ducklings produced received the same treatment as their parents. No important interactions between B and Se were found in terms of effects on adult health, reproductive success, duckling growth and survival, and tissue residues. Exposure to B alone at 900 mg/kg resulted in weight loss in adult females, reduced duckling growth and survival, and a significant reduction in hatching success, egg fertility and number of ducklings produced per female. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg were used to convert the exposure concentrations to units of mg/kgBW/day (Piccirillo and Quesenberry 1980). A LOAEL of 100 mg/kgBW/day (900 mg/kg) and a NOAEL of 50 (450 mg/kg) were calculated based on the results of this experiment. Based on the ecological significance of the endpoints (growth, reproduction and survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by B to avian receptors.

Piccirillo, V.J. and R.P. Quesenberry. 1980. Reproductive capacities of control mallard ducks (Anas platyrhynchos) during a one-generation reproduction study. J. Environ. Path. Toxicol. 4:133-139.

Smith, G.J. and V.P. Anders. 1989. Toxic effects of boron on mallard reproduction. Environ. Toxicol. Chem. 8(10):943-950.

Stanley, T.R., G.J. Smith, D.J. Hoffman, G.H. Heinz and R.Rosscoe. 1996. Effects of boron and selenium on mallard reproduction and duckling growth and survival. Environ. Toxicol. Chem. 15(7):1124-1132.

J.7.2 Toxicity to Mammals

Weanling Sprague-Dawley rats were fed diets containing borax or boric acid at concentrations of 0, 117, 350 or 1,170 mg/kg as B equivalents for 2 years (Weir and Fisher 1972). Reduced food consumption, suppressed growth, and atrophic testes were observed in rats fed diets containing B at a concentration of 1,170 mg/kg. In a second study, rats were fed diets containing borax or boric acid at the above exposure concentrations for 14 weeks prior to their first breeding phase through production of 3 generations. No adverse effect on litter size, progeny weight, fertility indices or lactation indices were observed in rats fed 117 or 350 mg/kg B. Rats exposed to B at the highest exposure concentration were sterile. A body weight of 0.48 kg and ingestion rate of 0.034 kg/day were used to convert the exposure concentrations to units of mg/kgBW/day (U.S. EPA 1988). A LOAEL of 82.9 mg/kgBW/day and a NOAEL of 24.8mg/kgBW/day were calculated based on results of this experiment. Based on the ecological significance of the endpoint (growth and reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by B to mammalian receptors.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. United States Environmental Protection Agency. EPA/600/6-87-008.

Weir, R. J., Jr., and R. S. Fisher (1972). "Toxicological studies on borax and boric acid." Toxicol. Appl. Pharmacol. **23**: 351-364.

J.8 Cadmium

J.8.1 Toxicity to Birds

Juvenile mallard drakes were fed diets containing 0, 50, 150, or 450 mg/kg of cadmium (Cd) for 42 days (Di Giulio and Scanlon 1985). An ingestion rate of 0.0578 kg/day and a body weight of 0.936 kg (Sugden *et al.* 1981) were used to convert the exposure concentrations to units of mg/kgBW/day. Significant metabolic effects were seen only in the 450 mg/kg (27.8 mg/kg BW/day) treatment group. Birds exposed to Cd at this concentration exhibited 20.3 % decrease in body weight, 26 % decrease in liver weight, 15 % increase in kidney weight, 21 % decrease in liver aldolase activity, 46 % increase in plasma uric acid concentrations, 74 % decrease in plasma triiodothyronine concentrations, 28 % increase in adrenal weights, and 31 % increase in adrenal cortisone concentrations. Ducks in the 150 mg/kg (9.3 mg/kg BW/day) treatment group also exhibited 12 % increase in kidney weight and 23 % increase in adrenal weight. No adverse effects were observed at a dietary concentration of 50 mg/kg (3.1 mg/kg BW/day).

Adult (one year old) male and female mallard ducks were fed a diet containing 0.08, 1.6, 15.2, and 210 mg/kg, wet weight of Cd as cadmium chloride *ad libitum* for 90 days (White and Finley 1978). An ingestion rate of 0.139 kg/day and a body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. The corresponding daily dietary intake dosages were 0.009 mg/kg BW/day, 0.18 mg/kg BW/day, 1.7 mg/kg BW/day, and 23.4 mg/kg BW/day, respectively. Male testis weight, male kidney weights, and egg production by females were significantly less in the 210 mg/kg (23.4 mg/kg BW/day) treatment when compared with the controls. No adverse effects were observed at dietary concentrations of 15.2 mg/kg or less.

Mallard ducklings were fed 0, 5, 10, or 20 mg/kg of Cd in their diet from 1 day of age to 12 weeks of age (Cain *et al.* 1983). An ingestion rate of 0.0578 kg/day and a body weight of 0.936 kg (Sugden *et al.* 1981) were used to convert the exposure concentrations to units of mg/kgBW/day. Ducklings receiving 20 mg/kg (1.2 mg/kg BW/day) Cd exhibited an 8 % decrease in packed cell volume, a 6 % reduction in hemoglobin concentration, and a 52 % increase in serum glutamic pyruvic transaminase activity, all of which were statistically significant at the 0.05 level. Necropsies of these specimens revealed mild to severe kidney lesions, and whole body Cd concentrations ranged from 58.30 to 65.30 mg/kg, dry weight. No significant adverse effects were noted at a dietary Cd level of 10 mg/kg (0.7 mg/kg BW/day).

Male Japanese quail that were fed a diet containing 75 mg/kg (11.3 mg/kg BW/day) of Cd as cadmium chloride for four weeks exhibited a 62 % decrease in testis size, a lack of spermatogenesis, damage to small intestine mucosa, and severe anemia (Richardson *et al.* 1974). These responses were associated with a mean liver Cd concentration of 42 mg/kg. An ingestion rate of 0.018 kg/day and a body weight of 0.12 kg (Varghese 2000) were used to convert the exposure concentration to units of mg/kgBW/day. A five day exposure/three day post-exposure LC_{50} of 1,496 mg/kg Cd was calculated for this species (Hill and Camardese 1986).

Domestic hens fed a diet containing 50 mg/kg (3.6 mg/kg BW/day) and 100 mg/kg (7.1 mg/kg BW/day) Cd also exhibited reduced egg production and egg weight (Anke *et al.* 1970). A concentration of 200 mg/kg (14.2 mg/kg BW/day) Cd resulted in ceased egg production within two days. An ingestion rate of 0.103 kg/day and a body weight of 1.45 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day.

Juvenile (two week old) male Leghorn chickens were fed a diet *ad libitum* containing various concentrations of Cd in two separate experiments (Pritzl *et al.* 1974). The first experiment used Cd concentrations of 0, 400, 600, 800, and 1,000 mg/kg for 20 days; whereas, the second experiment used Cd concentrations of 0 and 700 mg/kg for 20 days. A significant reduction in growth rate and feed consumption was noted at a dietary concentration of 400 mg/kg (39.4 mg/kgBW/day). An LD_{50} of 565 mg/kg (55.6 mg/kg BW/day) was calculated from the second experiment. An ingestion rate of 0.019 kg/day and a body weight of 0.193 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day.

Leghorn chickens were fed a diet containing cadmium sulfate for a period of 48 weeks. Egg production and eggshell thickness decreased significantly in hens exposed to a dietary concentration of 48 mg/kg, but were not affected at an exposure concentration of 12 mg/kg (Leach *et al.* 1979). This study was used to develop the LOAEL and NOAEL values because of the long exposure period and the ecological significance of the endpoints. An ingestion rate of 0.103 kg/day and adult body weight of 1.45 kg (U.S. EPA 1988) were used to convert the mg/kg diet concentrations to units of mg/kgBW/day. A LOAEL of 3.4 mg/kg BW/day and a NOAEL of 0.85 mg/kg BW/day Cd were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Cd to avian receptors.

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Di Giulio, R. T. and P. F. Scanlon (1985). "Effects of cadmium ingestion and food restriction on energy metabolism and tissue metal concentration on mallard ducks (*Anas platyrhynchus*)." Environ. Res. **37**(2): 433-444.

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Sugden, L. G., E. A. Driver and M. C. S. Kingsley (1981). "Growth and energy consumption by captive mallards." Can. J. Zool. **59**: 1567-1570.

U.S. EPA (1988). Recommendations for and documentation of biological values for use in risk assessment, United States Environmental Protection Agency.

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White, D. H. and M. T. Finley (1978). "Uptake and retention of dietary cadmium in mallard ducks." Environ. Res. **17**(1): 53-59.

J.8.2 Toxicity to Mammals

Male and female weanling brown rats were fed a control diet, a diet containing 5 mg/kg of Cd as cadmium chloride, or fed the control diet and given drinking water which contained Cd at a concentration of 5 mg/L for 18 months (Pribble and Weswig 1973). Growth was measured for 10 weeks following exposure to Cd. Growth rate of male rats exposed to Cd via drinking water was significantly less control animals; no effects on growth were observed in females or males exposed via diet. Exposure concentrations were converted to units of mg/kgBW/day using a food ingestion rate of 0.016 kg/day, a water ingestion rate of 0.0245 L/day, and a body weight of 0.152 kg (U.S. EPA 1988). A LOAEL of 0.8 mg/kgBW/day was calculated for water exposure, and a NOAEL of 0.53 mg/kgBW/day was calculated for exposure via diet based on results of this experiment. This study was not used to derive a TRV, as growth was the only parameter measured and growth is not considered and ecologically relevant endpoint.

Sprague-Dawley rats were administered Cd (as $CdCl_2$) orally at concentrations of 0, 0.1, 1.0 and 10 mg/kgBW/day for 6 weeks (Sutou *et al.* 1980a; Sutou *et al.* 1980b). After this, the animals were mated for 3 weeks. Females were administered Cd during gestation and sacrificed on day 20 for fetal examination. Number of total implantations and live fetuses decreased significantly, and number of resorbed fetuses increased significantly in the group exposed to Cd at a concentration of 10 mg/kgBW/day. No significant effects were observed in the group exposed to 1.0 mg Cd/kgBW/day. A LOAEL of 10 and a NOAEL of 1.0 were identified from this experiment.

Female mice were fed diets containing Cd at concentrations of 0.25, 5, or 50 mg/kg for 252 days (Bhattacharyya *et al.* 1988). One-half of the females were bred for 6 consecutive rounds of pregnancy/lactation, while the remaining females served as non-pregnant controls. Significant decreases in body weight, femur Ca content, and femur Ca/dry weight ratio were observed in the pregnant mice fed Cd at 50 mg/kg. An ingestion rate of 0.0058 kg/day and adult body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 8.8 mg/kgBW/day and a NOAEL of 0.88 were calculated based on the results of this experiment.

Male Wistar rats were fed diets containing Cd [as either cadmium chloride or cadmium-metallothionein; (CdMt)] at concentrations of 0, 0.3, 3, 30 or 90 mg/kg for 10 months (Groten *et al.* 1994). In rats fed cadmium chloride, kidney Cd concentrations were higher than in rats fed the same doses as CdMt. Histopathological effects (Glomerulonephrosis and basophilic tubules) were observed in rats fed cadmium chloride at concentrations of 30 and 90 mg/kg, and CdMt at a concentration of 90 mg/kg. Nephrotoxicity was mainly related to total renal

Cd concentration. An ingestion rate of 0.027 kg/day and adult body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 2.3 mg/kgBW/day and a NOAEL of 0.23 were calculated based on the results of this experiment.

Cadmium was toxic to mice administered an oral dose of 10 ppm Cd in drinking water (Schroeder and Mitchener 1971). Numerous abnormalities were observed in offspring, and 60 % of the second generation breeding pairs failed to breed . A water ingestion rate of 0.0075 L/day and adult body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 2.3 mg/kg BW/day and an estimated NOAEL of 0.23 mg/kg BW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Cd to mammalian receptors.

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U.S. EPA (1988). Recommendations for and documentation of biological values for use in risk assessment, United States Environmental Protection Agency.

J.9 Chromium

J.9.1 Toxicity to Birds

Rosomer et al. (1961) reported no adverse effects on survival, growth, or food utilization in domestic chickens fed diets containing up to 100 mg/kg (7.1 mg/kgBW/day) of hexavalent chromium (Cr^{+6}) during a 32-day period. Kunishisa et al. (1966) demonstrated that diets containing less than 200 mg/kg (14.2 mg/kgBW/day) Cr^{+6} and 300 mg/kg (21.3 mg/kgBW/day) trivalent chromium (Cr^{+3}) had no adverse effects on young domestic chickens. An ingestion rate of 0.103 kg/day and adult body weight of 1.45 kg (U.S. EPA 1988) were used to convert the mg/kg diet concentrations to units of mg/kgBW/day.

Heinz and Haseltine (1981) exposed two to three year old breeding pairs of black ducks (*Anas rubripes*) to a diet containing 0, 20, or 200 mg/kg, wet weight, (0, 2, or 20 mg/kg BW/day) of Cr^{+3} as chromium potassium sulfate for a period of approximately five months (until the onset of egg-laying by the females). Hatched ducklings were then fed a mash diet containing the same concentrations as their parents. Seven-day old chicks were tested for avoidance behavior in response to a fright stimulus; none of the Cr concentrations resulted in alteration of avoidance behavior. An ingestion rate of 0.125 kg/day (Heinz et al. 1989) and adult body weight of 1.25 kg (Dunning 1993) were used to convert the mg/kg diet concentrations to units of mg/kgBW/day.

Chung et al. (1985) evaluated the dietary toxicity of Cr^{+6} and Cr^{+3} to young chickens, and the effects of manganese (Mn) and molybdenum (Mo) on the toxicity of chromium (Cr). Day-old broiler chicks were exposed to Cr^{+6} as potassium chromate in the diet at concentrations of 0, 900, 1,200 and 1,500 mg/kg or to Cr^{+3} as chromium sulfate at concentrations of 0 and 4,000 mg/kg for 2 weeks. Mortality was significantly greater and growth was depressed in all chicks exposed to Cr^{+6} (LOAEL of 900 mg/kg Cr^{+6}). Addition of Mn or Mo at 500 mg/kg significantly reduced the mortality caused by the Cr^{+6}, but did not prevent the growth depression observed at the two highest Cr doses. No mortality was observed in chicks fed Cr^{+3}, however growth was significantly depressed (LOAEL of 4,000 mg/kg Cr^{+3}). Tissue concentrations of Cr were higher in chicks fed diets containing only Cr^{+6}, indicating Mn and Mo may interfere with Cr absorption. An ingestion rate of 0.0075 kg/day and body weight of 0.066 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day[2]. A LOAEL of 102.3 mg/kgBW/day and an estimated NOAEL of 10.2 mg/kgBW/day were calculated for Cr^{+6}, and a LOAEL of 455 mg/kgBW/day and an estimated NOAEL of 45.5 mg/kgBW/day were calculated for Cr^{+3} based on the results of this study.

Haseltine et al. (1985), in an unpublished study reported by Eisler (1986), fed black ducks diets containing 10 or 50 mg/kg anionic Cr^{+3} as Cr $K(SO_4)_2 \cdot 12H_20$ for five months. No effects were observed on survival, reproduction and blood chemistry. Ducklings produced by the treated groups were fed diets containing Cr at the original parental dosages; there was a significant reduction in survival in the 50 mg/kg exposure group. An ingestion rate of 0.125 kg/day (Heinz et al. 1989) and adult body weight of 1.25 kg (Dunning 1993) were used to

[2] An ingestion rate and body weight for 7-day old chicks was used to estimate contaminant exposure. While this will over- and under estimate food consumption by younger and older chicks, it was assumed to approximate food consumption throughout the 2 week study.

convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 1 mg/kg BW/day and LOAEL of 5 mg/kg BW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Cr to avian receptors.

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J.9.2 Toxicity to Mammals

An LD_{50} value of 260 mg/kg BW was derived for mice exposed to Cr^{+3}, and an LD_{50} value of 5 mg/kg BW was derived for mice exposed to Cr^{+6} (Steven et al. 1976). Altered blood chemistry and morphological changes in the liver were observed in rabbits administered both Cr^{+3} and Cr^{+6} through intraperitoneal injection at a rate of 1.7 mg/kg BW/day (Tandon et al. 1978).

Rats (BD strain) were fed diets containing chromic oxide (Cr_2O_3; 68.42% Cr) at concentrations of 0, 1%, 2% or 5% for two years (Ivankovic and Preussmann 1975). Groups of 60 male and female rats were fed chromic oxide baked in bread five days per week for two years; they received the control diet with a vegetable supplement each weekend. Measurement endpoints were mortality, longevity, organ weight, and type and incidence of tumors. No significant differences in mortality, longevity, or type and frequency of tumors were observed at any exposure concentration. A dose-dependant reduction in liver and spleen weight was observed; however, no macroscopic or histological changes were observed in these organs. Rats exposed at a concentration of 5% consumed an average of 1,800 g Cr_2O_3/kgBW over the 600-day exposure period (reported by authors); an exposure concentration of 3 g Cr_2O_3/kgBW/day or 2.053 g Cr/kgBW/day was calculated. A NOAEL of 2,053 mg/kgBW/day and an estimated LOAEL of 20,530 mg/kgBW/day were identified from this experiment

MacKenzie et al. (1958) administered potassium chromate at six exposure concentrations (0, 0.45, 2.2, 4.5, 7.7 and 11 mg/L as potassium chromate) to albino Sprague-Dawley rats for a period of one year. No effects (endpoints measured were body weight and food consumption) were observed at any exposure level. In a second experiment, rats were given water containing Cr^{+6} or Cr^{+3} at a concentration of 25 mg/L for 1 year. Again, no effects on body weight or food consumption were observed. Rats receiving Cr^{+6} had tissue concentration nine times higher than the group which received Cr^{+3}. A water ingestion rate of 0.058 L/day and adult body weight of 0.48 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 3.02 mg/kgBW/day (25 mg/L) was calculated based on the results of this study.

Adult albino Swiss female mice were exposed to Cr^{+6} in drinking water at concentrations of 0, 250, 500 and 750 mg/L during days 14 to 19 of pregnancy (Junaid et al. 1995). Gestational weight gains and skeletal ossification in fetuses were significantly less for mice in the two highest exposure concentration groups than in control mice. Post-implantation losses and fetal abnormalities were significantly higher in the 500 and 750 mg/L exposure groups. An ingestion rate of 0.0075 L/day and a body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 114 mg/kgBW/day and a NOAEL of 56.8 were calculated based on the results of this study.

Adult female mice were administered Cr^{+6} in drinking water at concentrations of 0, 250, 500 and 750 mg/L during organogenesis (days 6 to 14 of gestation; Junaid et al. 1996). Maternal weight gain, number of fetuses per litter, and fetal weight were significantly lower than controls in the two highest exposure groups; number of resorption sites were significantly higher. A mean body weight of 0.038 kg (cited by authors) and water ingestion rate of 0.0075 L/day (500 mg/L exposure group) and 0.0073 L/day (250 mg/L exposure group; cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 98.7 mg/kgBW/day and a NOAEL of 48.0 mg/kgBW/day were calculated based on the results of this study.

Adult female mice were exposed to Cr^{+6} in drinking water at concentrations of 0, 250, 500 and 1,000 mg/L throughout their entire gestation period (Trivedi et al. 1989). Resorptions and postimplantation losses were significantly higher in the 250 mg/L exposure group as compared to controls; a reduction in cranial ossification was also observed. Significant skeletal abnormalities and embryotoxic effects were observed in the 500 mg/L exposure group; no implantation sites were found in the highest exposure group. An ingestion rate of 0.0075 L/day and a body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 56.8 mg/kgBW/day and an estimated NOAEL of 5.68 were calculated based on the results of this study. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Cr to mammalian receptors.

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Junaid, M., R.C. Murthy and D.K. Saxena. 1995. Chromium fetotoxicity in mice during late pregnancy. Vet. Human Toxicol. 37(4):320-323.

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Steven, J.D., L.J. Davies, E.K. Stanley, R.A. Abbott, M. Inhat, L. Bidstrup, and J.F. Jaworski. 1976. "Effects of Chromium in the Canadian Environment." *Nat. Res. Counc. Can.*, NRCC No. 15017. 168p.

Tandon, S.K., D.K. Saxena, J.S. Gaur, and S.V. Chandra. 1978. "Comparative Toxicity of Trivalent and Hexavalent Chromium: Alterations in Blood and Liver." *Env. Research* 15:90-99.

Trivedi, B., D.K. Saxena, R.C. Murthy and S.V. Chandra. 1989. Embryotoxicity and fetotoxicity of orally administered heavalent chromium in mice. Reproductive Toxicol. 3:275-278.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87/008.

J.10 Cobalt

J.10.1 Toxicity to Birds

Dietary levels of 1, 125, 250, and 500 mg cobalt (Co) per kg of feed were given to 1-day old broiler chicks for 14 days (Diaz et al. 1994). Increased mortality and gross lesions involving the gastrointestinal and skeletal systems and heart were observed in birds receiving 250 or 500 mg Co/kg diet. Ingestion rates of 0.027 (125 mg/kg exposure group) and 0.0144 (250 mg/kg exposure group) kg/day and body weights of 0.146 (125 mg/kg exposure group) and 0.082 (250 mg/kg exposure group) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 43.9 mg/kgBW/day and a NOAEL of 23.1 mg/kg/day were calculated. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Co to avian receptors.

Diaz, G.J., R.J. Julian and E.J. Squires. 1994. Lesions in broiler chickens following experimental intoxication with cobalt. Avian Diseases. 38:308-316.

J.10.2 Toxicity to Mammals

Chronic exposure of male mice to cobalt as cobaltous chloride significantly affected their reproductive potential, while acute administration had minimal effects (Pedigo et al. 1988). For the acute evaluation, male CD-1 mice were exposed to 0.01 milliliters (ml) body weight by intraperitoneal injection. No significant changes in epididymal sperm concentration or testicular weight were observed. For the chronic study, mice were exposed to cobaltous chloride in drinking water at concentrations of 100, 200 or 400 ppm administered *ad libitum* for 33 weeks. Water intake was monitored daily and body weights were measured weekly. An average Co intake of 0, 23.0, 42.0 and 72.1 mg/kgBW/day was reported for the control and three exposure groups. There was a significant decrease in testicular weight, epididymal sperm concentration, sperm motility and fertility in animals exposed to Co at a concentration of 72.1 mg/kgBW/day. A LOAEL of 72.1 mg/kgBW/day and a NOAEL of 42.0 mg/kgBW/day for Co were derived based on the results of this study.

Adult Sprague-Dawley rats were fed daily rations of laboratory chow supplemented with cobalt chloride at concentrations of 0, 5, or 20 mg/kgBW/day for 69 days (Nation et al. 1983). At the beginning of the study and on the final exposure day, atomic absorption analyses were performed on the feed to confirm dose levels were consistent throughout the study. Following 14 days of feeding on control or Co supplemented diets, standard training procedures were used to teach the rats to press a level to receive a food pellet. Schedule (operant) training began the day following pretraining, and continued for 35 sessions. Conditioned suppression (CER) training began the day after schedule training and lasted for five days. At the end of the study, animals were sacrificed and organ weights and tissue levels of Co were determined. A significant reduction in operant response rates were observed in animals exposed to Co at a concentration of 20 mg/kgBW/day. No difference in CER performance was noted in any treatment group. Significant testicular atrophy was observed in rats exposed to 20 mg/kgBW/day. A LOAEL of 20 mg/kgBW/day and a NOAEL of 5 mg/kgBW/day were identified from this experiment. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Co to mammalian receptors.

Nation, J.R., A.E. Bourgeois, D.E. Clark and M.F. Hare. 1983. The effects of chronic cobalt exposure on behavior and metallothionein levels in the adult rat. Neurobehavioral Toxicology and Teratology. 5:9-15.

Pedigo, N.G., W.J. George and M.B. Anderson. 1988. Effects of acute and chronic exposure to cobalt on male reproduction in mice. Reproductive Toxicology. 2:45-53.

J.11 Copper

J.11.1 Toxicity to Birds

In a chapter titled "Poisons causing Respiratory Insufficiency", Hatch (1978) cites a study that reports "in chicks, 325 ppm of copper (Cu) in the diet can cause signs of toxicosis, although if the Cu is present as copper oxide, chicks may tolerate 500 ppm without ill effect". The original citation for this study is not provided in Hatch; an earlier review is cited. Because the age of chicks is not specified by Hatch, it is not possible to estimate body weight and ingestion rate, and the exposure concentrations cannot be converted to units of mg/kgBW/day. In addition, parameters that were used to measure "signs of toxicosis" were not stated. Therefore, this study was not used to derive a TRV for Cu.

Mayo et al. (1956) evaluated Cu tolerance of young chickens. Growth, mortality and occurrence of muscular dystrophy were measured. In one experiment, a dietary concentration of 324 mg/kg resulted in muscular dystrophy and a significant inhibition of growth at 4 weeks of age. In another experiment, dietary Cu at a concentration of 520 mg/kg caused reduced growth at 4 weeks of age, but body weights of Cu-exposed birds were equal to controls at 8 weeks of age. When Cu was added as copper-bound casein instead of as copper sulfate, growth depression was not observed, but the incidence of muscular dystrophy remained the same. Significant mortality was observed in chicks fed diets containing Cu at a concentration of 1,270 mg/kg. This paper was only presented as an abstract, and it was not clear whether the chicks in the two experiments where growth inhibition was observed received different diets or different forms of supplemental Cu. No methods were presented to evaluate sample size, experimental design, or statistical analysis, therefore this study was not used to derive a TRV for Cu.

One-day old New Hampshire chicks were fed diets containing supplemental Cu (as copper oxide) at nominal concentrations of 0, 10.8, 26, 47.5, 78, 121.1, 182, 268.1, 390, 562.2, 806, 1,150.4 mg/kg diet for 10 weeks (Mehring et al. 1960). The basal diet contained 26 mg Cu/kg, and the four highest exposure diets were analyzed and found to contain Cu at concentrations of 403, 570, 749 and 1,180 mg/kg. The average live weight of chicks that received the diets containing 570, 749 and 1,180 mg/kg were 94.0%, 70.1% and 51.0% of the live weight of chicks fed the basal diet, respectively. Mortality rates of 15 and 40% were observed in the two highest exposure groups. After six weeks of feeding on the basal diet, the average live weight of chicks in the three highest exposure groups were 100.5%, 86.4%, and 83% of the live weights of chicks that received the basal diet for the duration of the experiment. Based on decreased growth (70.1% of control bird weight after 10 week exposure), an exposure concentration of 749 mg/kg diet was identified as the LOAEL in this experiment. A body weight of 0.356 kg and ingestion rate of 0.031 kg/day [cited in U.S. EPA (1988) for 5 week old chicks] were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 65.2 mg/kgBW/day and a NOAEL of 49.6 mg/kgBW/day were identified based on the results of this experiment.

A flock of 51-week old leghorn hens experienced a 16% decrease in egg production in a single week (Gilbert et al. 1996). Analysis of the feed showed a Cu concentration of 1,477 mg/kg. Severe oral ulcers were present in the pharynx of the hens. To confirm that the observed ulcers and decrease in egg production were due to excess dietary Cu, a group of 35 hens were fed diets containing Cu (as copper sulfate) at a concentration of 1,437 mg/kg diet for 2 weeks; the control group received a basal diet with a Cu concentration of 78 mg/kg. Egg production and food consumption were significantly lower in hens fed the high-Cu diet than in hens fed the basal diet. Pharyngeal lesions and gizzard erosions were significantly increased in hens fed the high Cu diet. A body weight of 1.45 kg (U.S. EPA 1988) and food ingestion rates of 0.129 kg/day (basal diet group) and 0.060 kg/day (1,437 mg/kg group, cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 59.5 mg/kgBW/day and a NOAEL of 6.9 mg/kgBW/day were calculated based on the results of this experiment.

Jackson (1977) exposed adult hens to dietary concentrations of Cu ranging from16 mg/kg (control diet) to 1,936 mg/kg for 35 days. No effects on body weight were observed at an exposure concentration of 256 mg/kg, while exposure to Cu at a concentration of 496 mg/kg caused marked body-weight loss. Egg production was not affected at an exposure concentration of 496 mg/kg, but it significantly decreased at an exposure concentration of 976 mg/kg. Because of the ecological significance of the reproductive endpoint (egg production), these values were used to develop a NOAEL (496 mg/kg) and LOAEL (976 mg/kg) in this assessment. Ingestion rates and body weights for each treatment group cited by the author were used to convert the exposure concentrations to units of mg/kgBW/day (0.101 kg/day and 1.73 kg, and 0.082 kg/day and 1.62 kg, respectively). A LOAEL of 49.4 mg/kgBW/day and a NOAEL of 28.9 mg/kg BW/day were calculated based on the results of this experiment.

White leghorn layers were fed diets supplemented with 0, 200, 400, 600, or 800 mg/kg copper sulfate for four weeks (Chiou et al. 1997). Measured dietary Cu concentrations were 27, 195, 405, 598 and 758 mg/kg. Food intake, egg production, liver function, and Cu residues in the liver, egg and excreta were measured. Food intake and egg production were significantly lower than that measured for control birds for the 598 and 758 mg/kg exposure groups. Liver enzyme activities were significantly higher in birds exposed at dietary concentrations of 598 and 758 mg/kg. Histological examination of livers showed bile duct proliferation and lymphocyte infiltration in livers of birds exposed at a concentration of 758 mg/kg. Copper residues in liver and excreta increased significantly as exposure concentration increased; egg concentrations peaked at an exposure concentration of 405 mg/kg. Based on reduced egg production, the exposure concentration of 598 mg/kg was selected as the LOAEL for this experiment. Food ingestion rates of 0.097 and 0.077 kg/day and body weights of 1.461 and 1.393 kg (cited by authors for the 405 and 598 mg/kg exposure groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 33.2 mg/kg BW/day and a NOAEL of 26.9 mg/kg BW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Cu to avian receptors.

Chiou, P. W., K. Chen and B. Yu (1997). "Toxicity, tissue accumulation and residue in egg and excreta of copper in laying hens." Animal Feed Science Technology **67**: 49-60.

Gilbert, R. W., J. E. Sander and T. P. Brown (1996). "Case report: Copper sulfate toxicosis in commercial laying hens." Avian Diseases **40**: 236-239.

Hatch, R. C. (1978). Poisons Causing Respiratory Insufficiency. In: Veterinary Pharmacology and Therapeutics. L. M. Jones, N. H. Booth and L. E. McDonald. Ames, IA, Iowa State University.

Jackson, N. (1977). "The effect of dietary copper sulphate on laying performance, nutrient intake and tissue copper and iron levels of the mature, laying domestic fowl." Br. J. Nutr. **38**: 93-100.

Mayo, R. H., S. M. Hauge, H. E. Parker, F. N. Andrews and C. W. Carrick (1956). "Copper tolerance of young chickens." Poultry Science **35**: 1156-1157.

Mehring, A. L., Jr.,, J. H. Brumbaugh, A. J. Sutherland and H. W. Titus (1960). "The tolerance of growing chickens for dietary copper." Poultry Science **39**: 713-719.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87-008.

J.11.2 Toxicity to Mammals

Young animals retain more dietary Cu than older animals and are more sensitive to Cu toxicity (Venugopal and Luckey 1978). Lecyk (1980) exposed mice to six dietary levels of copper sulfate [0, 0.5, 1.0, 1.5, 2.0, 3.0, and 4.0 grams per kilogram (g/kg)] for one month prior to mating. Mice were maintained on diets throughout day 19 of pregnancy, at which time females were killed and embryos were examined. At dietary exposure levels as high as 2 g/kg diet, no adverse effects on percent survival, litter size, fetal weight or number of abnormalities were found. Adverse effects on all measured endpoints were observed at a dietary exposure concentration of 3 g/kg. An ingestion rate of 0.0058 kg/day and adult body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 527 mg/kg BW/day and a NOAEL of 352 mg/kg BW/day were calculated based on the results of this study.

Mink were fed diets supplemented with 0, 25, 50, 100 or 200 mg/kg Cu (as $CuSO_4 \cdot 5H_20$) for 357 days; the control diet contained 60.5 mg/kg Cu (Aulerich et al. 1982). The Cu supplemented diets had no observed toxic effects on the adult animals. Percent mortality of kits from birth to four weeks of age was significantly greater in kits from female mink fed 100 or 200 mg/kg supplemental Cu. Because of the ecological significance of the endpoints and the exposure duration, results from this study were used to develop the LOAEL and NOAEL values used in this risk assessment. An ingestion rate of 0.249 kg/day (U.S. EPA 1993)and a body weight of 1.13 kg (Merritt 1987) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 35.4 mg/kg BW/day and a NOAEL of 24.3 mg/kg

BW/day were calculated. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Cu to mammalian receptors.

Aulerich, R.J., R.K. Ringer, M.R. Bleavins and A. Napolitano. 1982. Effects of supplemental dietary copper on growth, reproductive performance and kit survival of standard dark mink and the acute toxicity of copper to mink. Journal of Animal Science. 55(2):337-343.

Bleavins, M.R. and R.J. Aulerich. 1981. Feed consumption and food passage time in mink (*Mustela vison*) and European ferrets (*Mustela putorius furo*). Lab. Anim. Sci. 31:268-269.

Lecyk, M. 1980. "Toxicity of copper sulfate in mice embryonic development." *Zool. Pol.*, 28:101-106.

Merritt, J.F. 1987. Guide to the Mammals of Pennsylvania. Pittsburgh, PA: University of Pittsburgh Press. 408 p.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87-008.

U.S. EPA. 1993. Wildlife Exposure Factors Handbook, Volume I of II. United States Environmental Protection Agency, Office of Research and Development, Washington, D.C. EPA/600/R-93/187a.

Venugopal, B. and T.D. Luckey. 1978. *Metal Toxicity in Mammals: 2. Chemical Toxicity of Metals and Metalloids.* Plenum Press, New York, NY.

J.12 Iron

J.12.1 Toxicity to Birds

No studies were found that evaluated the toxicity of iron (Fe) to birds.

J.12.2 Toxicity to Mammals

Male weanling Sprague-Dawley rats were fed diets containing Fe at concentrations of 4 (iron-deficient), 35 (control), 350, 3,500 or 20,000 mg/kg for 12 weeks (Sobotka et al. 1996). Actual dietary Fe concentrations were not measured. Rats exposed to the highest concentration lost significant weight, were significantly less active, and exhibited decreased startle reflex and conditioned avoidance-response performance. The nature and extent of behavioral changes observed reflected a marked decrease in the ability of the rats to respond appropriately to environmental stimuli. Similar behavioral effects were observed in Fe-deficient animals, but body weight changes were less severe. Whole-brain nonheme Fe was significantly reduced in Fe-deficient animals, but increased only in the group which received the 20,000 mg/kg diet, suggesting homeostatic mechanisms regulate whole-brain Fe more effectively under conditions of dietary overload than under conditions of dietary deficiency. An ingestion rate of 0.023 kg/day and body weight of 0.267 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1,723 mg/kgBW/day and a NOAEL of 301.5 were calculated for Fe based on the results of this study.

Differential responses of rodent species to dietary Fe overload were evaluated by Whittaker et al. (1997). Weanling male B6C3F1 mice, C5YSF1 mice, and Fischer 344 rats were fed diets containing 35 (control), 1,500, 3,500 or 10,000 microgram per gram (µg/g) carbonyl iron for 12 weeks. Nine of 12 rats exposed at the highest concentrations died; no mortality was observed in mice at any exposure concentration. In all animals, there was a dose-related increase in liver nonheme Fe, and there was significant hypertrophy of the hepatocytes in B6C3F1 mice and Fischer 344 rats fed the 10,000 µg/g diet. Rats in the 10,000 µg/g dose group had marked dose-dependant nephropathy, testicular atrophy, and lack of mature sperm. Based on the observed mortality, testicular atrophy, and lack of mature sperm in rats exposed at a concentration of 10,000 µg/g, this dose was selected as the LOAEL. An ingestion rate of 0.018 kg/day and body weight of 0.18 kg (U.S. EPA 1988; values cited as time-weighted averages for male Fischer 344 rats from weaning to 90 days of age) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1000 mg/kgBW/day and a NOAEL of 350mg/kgBW/day were calculated for iron based on the results of this study. Based on the ecological significance of the endpoints (reproduction and survival) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Fe to mammalian receptors.

Sobotka, T.J., P. Whittaker, J.M. Sobotka, R.E. Brodie, D.Y. Quander, M. Robi, M. Bryant and C.N. Barton. 1996. Neurobehavioral dysfunctions associated with dietary iron overload. Physiology and Behavior. 59(2):213-219.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87/008.

Whittaker, P., V.C. Dunkel, T.J. Bucci, D.F. Kusewitt, J.D. Thurman, A. Warbritton and G.L. Wolff. 1997. Genome-linked toxic responses to dietary iron overload. Toxicologic Pathology. 25(6):556-564.

J.13 Lead

J.13.1 Toxicity to Birds

The gastric motility of adult male and female red-tailed hawks (*Buteo jamaicensis*) fed 0.82 and 1.64 mg/kg BW/day (mg/kgBW/day concentration reported by authors) for three weeks was evaluated through the use of surgically implanted transducers. Neither concentration had any effect on gastric contractions or egestion of undigested material pellets (Lawler et al. 1991).

Adult male and female red-tailed hawks were administered lead acetate by gavage at a concentration of 0.82 mg/kg BW/day for three weeks (Redig et al. 1991). Compared to control birds, there was an 83 % decrease in delta-aminolevulinic acid dehydratase (ALAD) activity and a 74 % increase in the levels of free porphyrins circulating in the blood of experimental birds. Immune function (as measured by antibody titers to foreign red blood cells or mitogenic stimulation of T-lymphocytes) was not significantly affected at this exposure level.

Beyer et al. (1988) fed red-winged blackbirds, brown-headed cowbirds, common grackles, northern bobwhites and eastern screech owls diets containing lead acetate. The dietary concentration was increased by 60 % weekly until half of the birds in each treatment group died. Because the exposure concentrations changed throughout the experiment, this study was not used to derive TRVs for this risk assessment.

One-day old American kestrel chicks were dosed orally with metallic Pb at concentrations of 0, 25, 125 or 625 mg/kgBW/day for 10 days (Hoffman et al. 1985a and 1985b). Forty percent of the birds in the highest dose group died after six days of exposure. Growth rates of birds which received Pb at concentrations of 125 or 625 mg/kgBW/day were significantly lower than the growth rates of control birds.

The effect of Pb on survival of American kestrels was evaluated by feeding the birds either a control diet, or a diet containing mallard ducks which had died of Pb poisoning (mean Pb concentration was 29.3 mg/kg) for 60 days (Stendell 1980). No kestrels died or exhibited visible signs of Pb poisoning during the 60-day exposure period. An ingestion rate of 0.0307 kg/day (Barrett and Mackey 1975) and a body weight of 0.111 kg (Dunning 1993) were used to convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 8.1 mg/kgBW/day was calculated based on the results of this experiment.

Ringed turtle doves received 0 or 100 micrograms per milliliter (μg/ml) Pb in their drinking water from two weeks prior to breeding throughout a breeding cycle (Kendall and Scanlon 1981). Exposure to Pb did not increase the time required to produce eggs, and no adverse effects on egg production or fertility were observed. Bone Pb concentrations in adult birds and bone and liver Pb concentrations in juveniles were higher than in control birds or progeny of control birds. A water ingestion rate of 0.017 L/day (calculated using an allometric equation from Calder and Braun 1983) and a body weight of 0.16 kg (Schwarzbach et al. 1991) was used to convert the exposure concentration to units of mg/kgBW/day. A NOAEL of 10.6 mg/kgBW/day was calculated based on the results of this experiment.

Bobwhite quail were fed diets supplemented with Pb (as lead acetate) at concentrations of 0, 500, 1,000, 1,500, 2,000 and 3,000 mg/kg for 6 weeks (Damron and Wilson 1975). Weight gain and food consumption were significantly decreased in birds receiving the two highest exposure concentrations. Mortality of birds receiving 3,000 mg/kg Pb was 46.7 %, much greater than any other exposure group; however, it was not statistically significant due to large variability among replicate pens. In another experiment, male bobwhite were fed diets containing 0, 500, 1,000 or 1,500 mg/kg Pb (as lead acetate) for eight weeks. Mortality, food consumption, sperm concentration and sperm viability were measured; no effects were observed at any exposure concentration. A food ingestion rate of 0.0143 kg/day and adult body weight of 0.169 kg were used to convert the exposure concentrations to units of mg/kgBW/day; 2,000 mg/kg was selected as the NOAEL level. A NOAEL of 127 (exposure concentration of 1,500 mg/kg, endpoint measured sperm concentration and viability) and an estimated LOAEL of 1,270 mg/kgBW/day were calculated based on the results of this experiment.

Day-old Canada geese were fed diets supplemented with Pb-contaminated sediment concentrations of 1.9 (control diet), 414, 828 and 1,656 µg/g for six weeks (Hoffman et al. 2000a). Mortality was observed only in the highest exposure group (22 %), but it was not significantly different from the control group. Hematocrit, hemoglobin, and ALAD activity were significant lower and protoporphyrin levels were higher in the two highest exposure groups. Renal tubular degeneration was observed in one gosling from the 1,656 µg/g group, but histopathologic lesions most commonly associated with Pb poisoning in waterfowl were not observed in other geese. Growth was decreased in goslings from the highest exposure group. Because none of the effects measured in this experiment are considered ecologically relevant, results of this experiment were not used to derive TRVs for exposure of birds to Pb.

Day-old mallard ducklings were fed diets supplemented with Pb-contaminated sediment at concentrations of 1.9 (control diet), 414 and 828 µg/g for six weeks (Hoffman et al. 2000b). A clean sediment-supplemented control (24 % sediment) and a positive control diet containing lead acetate at a concentration equivalent to the 828 µg/g Pb-contaminated sediment diet were included in the experimental design. Mortality was observed only in the lead acetate group (7 %), but was not significantly different from the control group. Hematocrit and hemoglobin were significantly lower in ducklings which received lead acetate. Blood ALAD activity levels were significantly lower and protoporphyrin levels were higher in both groups which received Pb-contaminated sediment and the ducklings which received lead acetate. Acid-fast renal tubular inclusion bodies and nephrosis are abnormalities associated with Pb poisoning; inclusion bodies were observed in 50 % and tubular nephrosis was observed in 75 % of ducklings fed lead acetate. Renal inclusion bodies were observed in two of nine ducklings from the 414 µg/g group, and in 4 of 9 ducklings from the 828 µg/g group. Growth was affected only in ducklings fed lead acetate. Based on the reduced growth observed in ducklings exposed to lead acetate at a concentration of 828 µg/g, this concentration was selected as the LOAEL for this experiment. A food ingestion rate of 0.0645 kg/day and body weight of 0.379 kg (cited by Sugden et al. 1981 for three-week old mallard ducklings) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 140.9 mg/kgBW/day and an estimated NOAEL of 14.1 mg/kgBW/day were calculated based on results of this experiment.

Heinz et al (1999) studied the bioavailability and toxicity of Pb-contaminated sediment to adult mallards. In the first experiment, ducks were fed a pelleted commercial duck diet containing 0, 3, 6, 12 or 24 % Pb-contaminated sediment (103, 207, 414 and 828 µg/g lead, respectively) for five weeks. Ducks fed the 24 % Pb-contaminated sediment exhibited atrophy of the breast muscles, green staining of the feathers around the vent, viscous bile, green staining of the gizzard lining, and renal tubular intranuclear inclusion bodies; one of 10 birds died. In the second experiment, the dietary concentration of the Pb-contaminated sediment was increased to 48 %, but only about 20 % was actually ingested due to food washing by the birds.

Duration of this experiment was also five weeks. Protophyrin levels were elevated, and all of the Pb-exposed birds had renal tubular intranuclear inclusion bodies. A third experiment was conducted to determine if the effects of Pb were greater when birds were fed a nutritionally deficient diet. Ducks were fed a control diet, a commercial duck mash with 24 % Pb-contaminated sediment, or a ground corn diet with 24 % Pb-contaminated sediment for 15 weeks. Food washing was again observed; actual ingestion rates were 17 and 14 % for the Pb-contaminated duck mash and ground corn diets, respectively. Mortality occurred in four of five birds fed the Pb-contaminated ground corn diet. At necropsy, all birds fed the Pb-contaminated ground corn diet were emaciated, had renal tubular intranuclear inclusion bodies, and blackish-green bile. Based on the clinical signs of Pb poisoning observed in the first experiment, an exposure concentration of 828 µg/g Pb was selected as the LOAEL from this experiment. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 92 mg/kgBW/day and a NOAEL of 46 mg/kgBW/day were calculated based on the results of this experiment.

Day-old Japanese quail were fed diets containing Pb (as lead acetate) at concentrations of 0, 1, 10, 100, 500 or 1,000 mg/kg for five weeks (Morgan et al. 1975). Body weight, packed cell volume, and hemoglobin were significantly reduced in birds that received 1,000 mg/kg lead. At five weeks of age, testes size was also significantly reduced in the highest exposure group; this exposure concentration was identified as the LOAEL. Mean body weights of the 500 and 1,000 mg/kg exposure groups at three weeks were 65 and 55 g. Ingestion rates were calculated as a percent of the adult ingestion rate of 18 g/day (body weight of 0.12 kg; Varghese 2000), resulting in ingestion rates of 9.8 and 8.3 g/day, respectively. A LOAEL of 151 mg/kgBW/day and a NOAEL of 75.4 mg/kgBW/day were calculated based on the results of this experiment.

Nine raptors (five red-tailed hawks, three rough-legged hawks and one golden eagle) were administered 3 mg/kgBW Pb daily in the form of a lead acetate trihydrate solution by mouth for 30 weeks (Reiser and Temple 1980). Control birds (six red-tailed hawks, one Swainsons hawk) were dosed with a sodium acetate solution by mouth. Clinical signs of lead toxicosis (anorexia, green bile-stained feces and anemia) were observed in eight of the nine experimental birds. Three birds died three to four weeks following the onset of clinical symptoms. This study was not used to derive the TRVs for this risk assessment because dosing was via solution rather than dietary, and because different species were included within the experimental group.

Edens et al. (1976) exposed Japanese quail to four dietary concentrations of lead acetate (1, 10, 100 and 1,000 mg/kg) for a period of 12 weeks. Percent hatch of setable eggs was significantly decreased in hens exposed to 100 mg/kg Pb. Dietary Pb at a concentration of 1,000 mg/kg almost completely suppressed egg production. The results from this experiment will be used to develop the NOAEL and LOAEL values because of the ecological significance of the endpoints and the method and duration of exposure. An ingestion rate of 18 g/day and adult body weight of 0.12 kg (Varghese 2000) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 15 mg/kg BW/day (100 mg/kg) and a NOAEL of 1.5 mg/kg BW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Pb to avian receptors.

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J.13.2 Toxicity to Mammals

Mason and MacDonald (1986) evaluated the effect of Pb and Cd on otter (*Lutra lutra*). Daily Pb intake was estimated on the basis of measured fecal Pb levels, the known ingestion rate for otter, and gastrointestinal Pb absorption rates for mammals. Estimated Pb intake correlated well with levels measured in major fish prey species. No apparent impact on population levels was found when the Pb intake was less than 0.15 mg/kg BW/day whereas otter populations were reduced in sites where the estimated Pb intake exceeded 2 mg/kg BW/day. This study was not used to derive a TRV for Pb, as other factors that may have influenced otter population levels were not evaluated.

Adult pregnant mice (C57Bl strain) were fed a diet containing Pb at concentrations of 0, 0.125, 0.25, 0.5, or 1 % for 48 hours following observation of the presence of a vaginal plug (Jacquet et al. 1976). Dietary Pb concentrations of 0.125 %, 0.25 %, and 0.5 % resulted in an increase in the number of embryos in the four-cell stage versus the eight-cell stage. At a dietary exposure level of 1 %, an increase in the number of undivided embryos was observed. In normal mouse embryo development, the embryo is in the eight-cell stage after 48 hours and is placed near the end of the oviduct ready to be discharged to the uterus. Effects of delayed cleavage on embryo loss prior to implantation is not known. An ingestion rate of 0.0058 kg/day and adult body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 220 mg/kg BW/day (1,250 mg/kg), and an estimated NOAEL of 22 mg/kg BW/day were calculated based on the results of this experiment.

Pregnant female mice were given lead acetate in their drinking water at concentrations of 0, 500, 750 and 1,000 mg/L starting on gestation day 12 and continuing to four weeks postpartum (Waalkes et al. 1995). Offspring were weaned and received Pb in their drinking water after weaning for 112 weeks. Renal lesions (atypical tubular hyperplasia or tumors) occurred rarely in control male mice (4 %) and increased in dose related fashion for Pb exposed male offspring: 500 ppm, 16 %; 750 ppm, 24 %; and 1,000 ppm, 48 %. The number of lesions in the 1,000 mg/L group was significantly higher than for the control group. Lead-treated females also developed renal lesions, but at much lower rates. An ingestion rate of 0.0058 kg/day and adult body weight of 0.033 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 176 mg/kg BW/day (1000 mg/kg), and a NOAEL of 132 mg/kg BW/day were calculated based on results of this study.

Azar et al. (1973) administered Pb to rats at six dietary levels (1, 10, 50, 100, 1,000 and 2,000) for three generations and measured changes in reproduction and growth. No effects on number of pregnancies, number of pups born alive, fertility index, viability index or lactation index were observed at any exposure levels. An exposure concentration of 1,000 mg/kg resulted in reduced offspring weight and kidney damage in the young. An ingestion rate of 0.027 kg/day and adult body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 80 mg/kg BW/day, and a NOAEL of 8 mg/kg BW/day were calculated. Based on the ecological significance of the endpoint (growth) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Pb to mammalian receptors.

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J.13 Magnesium

J.13.1 Toxicity to Birds

Day-old Japanese quail were given diets supplemented with magnesium (Mg) in graded concentrations of 125, 200, 225, 250, 275, 300, 500, 750, 1,000, 1,500 or 2,000 mg/kg for 14 days (Harland et al. 1976). The concentration of Mg in the basal diet was 21 mg/kg. Effects measured included mortality, gross physical and behavioral abnormalities, hematology and bone mineralization. A dietary concentration of 321 mg/kg was considered adequate to meet the young quail's dietary requirement; signs of deficiency were observed at all dietary concentrations less than 321 mg/kg (73 mg/kgBW/day, calculated using cited body weight of 20.8 g). At concentrations greater than 321 mg/kg, the only adverse effect observed was significant mortality in birds which received a dietary concentration of 2,021 mg/kg. Body weights of 0.0197 kg and 0.0207 kg (mean weight of birds at 7 days from the 2,021 mg/kg and 1,521 mg/kg exposure groups, respectively) and ingestion rates of 0.0045 and 0.0047 kg/day (calculated using an allometric equation from Nagy 1987) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 462 mg/kgBW/day and a NOAEL of 345 mg/kgBW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Mg to avian receptors.

Harland, B.F., M.R. Spivey Fox and B.E. Fry, Jr. 1976. Magnesium deficiency, requirement and toxicity in the young Japanese quail. Poultry Science. 55:359-364.

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J.13.2 Toxicity to Mammals

Mice (strain B6C3F$_1$) were fed diets containing Mg as magnesium chloride at concentrations of 0, 3,000, 6,000, 12,500, 25,000 or 50,000 mg/kg for 13 weeks (Tanaka et al. 1994). No treatment-related effects were observed in terms of survival, overt signs of toxicity, behavior, hematology or blood biochemistry. Average body weight of mice which received the highest concentration of Mg were lower than those of controls, although daily food ingestion and water intake rates were not different. Degenerative changes were observed in kidneys of male mice which were fed diets containing 50,000 mg/kg Mg. No histopathological changes were observed in females exposed at any dose concentration. Body weights of 0.026 and 0.03 kg and ingestion rates of 0.0064 and 0.00665 kg/day (for the 50,000 and 25,000 mg/kg exposure groups, respectively; cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 12,308 mg/kgBW/day and a NOAEL of 5,542 mg/kgBW/day were calculated. Because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Mg to mammalian receptors.

Tanaka, H., A. Hagiwara, Y. Kurata, T. Ogiso, M. Futakuchi and N. Ito. 1994. Thirteen-week oral toxicity study of magnesium chloride in B6C3F$_1$ mice. Toxicology Letters. 73:25-32.

J.14 Manganese

J.14.1 Toxicity to Birds

Male Japanese quail were exposed to basal diets (56 mg/kg Mn) supplemented with 5,000 mg/kg manganese oxide for 75 days (Laskey and Edens 1985). No reduction in growth was observed, and aggressive behavior was reduced relative to control birds. Reduced aggressive behavior was not considered an adverse effect. The reported exposure concentration of 977 mg/kgBW/day was used as the NOAEL for this risk assessment, and a LOAEL of 9,770 mg/kg was estimated using a factor of ten.

Laskey, J.W. and F.W. Edens. 1985. Effects of chronic high-level manganese exposure on male behavior in the Japanese Quail (*Coturnix coturnix japonica*). Poult. Sci. 64:579-584.

J.14.2 Toxicity to Mammals

Pregnant female Long-Evans rats were exposed to normal Fe or low Fe diets containing manganese oxide at concentrations of 50 (basal diet), 400, 1,100 and 3,550 mg/kg from day one of gestation through 224 days of age of the offspring (Laskey et al. 1982). The offspring began feeding on the Mn-treated diets at 14 to 15 days of age. Mortality of all animals on the low-Fe diet with 3,550 mg/kg Mn exceeded 90 % by day 50; no mortality was observed in any other treatment group. At 90 to 100 days of age, non-littermate males and females from each dose group were caged for two weeks. Pregnancy percentage was significantly reduced in F$_1$ female rats which received a normal-Fe diet which contained Mn at a concentration of 3,550 mg/kg. Reproductive development (decreased testes weight, sperm count and testosterone concentration) was affected in males which received the normal-Fe diet and Mn at a concentration of 3,550 mg/kg. An ingestion rate of 0.031 kg/day and body weight of 0.41 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 268 mg/kg BW/day, and a NOAEL of 83 mg/kg BW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Mn to mammalian receptors.

Laskey, J.W., G.L. Rehnberg, J.F. Hein and S.D. Carter. 1982. Effects of chronic manganese (Mn_3O_4) exposure on selected reproductive parameters in rats. J. Toxicol. Environ. Health. 9:677-687.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87/008.

J.15 Mercury

J.15.1 Toxicity to Birds

Chickens were fed diets containing mercury (Hg) (from herring meal) at concentrations of 0, 0.014 and 0.018 mg/kg for 52 weeks (March et al. 1974). Adult mortality and body weight were not affected by dietary Hg at the concentrations tested. Egg fertility, hatchability and quality (e.g., egg weight or shell thickness) were not affected by Hg. An ingestion rate of 0.103 kg/day and body weight of 1.45 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 0.0012 mg/kgBW/day was calculated based on the results of this experiment.

Japanese quail were fed diets containing methylmercury at concentrations of 0 or 30 mg/kg (Welsh and Soares 1976). All birds fed the diet containing 30 mg/kg were dead within two weeks. Addition of Se (0.05, 0.1, or 0.6 mg/kg) or vitamin E [10 or 500 International Units (IU)] markedly decreased the lethal effects of Hg. Except the birds which received 0.6 mg/kg Se, all experimental birds were dead at the end of the experimental period (34 days). An ingestion rate of 0.018 kg/day and body weight of 0.12 kg (Varghese 2000) were used to covert the exposure concentration to units of mg/kgBW/day. A LOAEL of 4.5 mg/kgBW/day and NOAEL of 0.45 mg/kgBW/day were calculated based on the results of this experiment.

Laying hens were fed diets containing Hg (as phenyl mercuric chloride) at concentrations of 0, 5, and 30 mg/kg for two months (Pribilincova et al. 1996). Egg production and egg weight were significantly reduced in the group exposed to Hg at a concentration of 30 mg/kg. Fertility and hatchability were not affected at any exposure concentration. An ingestion rate of 0.12 kg/day (cited by authors) and body weight of 1.45 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 2.5 mg/kgBW/day and a NOAEL of 0.41 mg/kgBW/day were calculated based on the results of this experiment.

Effects of dietary methylmercury on zebra finches (seed eaters) were evaluated by Scheuhammer (1988). Four groups of birds were fed diets containing 0, 1.0, 2.5 or 5.0 µg/g methylmercury. A dietary level of 5 µg/g caused significant neurological impairment and death in zebra finches. No symptoms were noted in the group fed levels of 2.5 µg/g. An ingestion rate of 0.0049 kg/day and body weight of 0.014 kg (cited by author) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1.75

mg/kgBW/day and a NOAEL of 0.88 mg/kgBW/day were calculated based on the results of this experiment.

Total Hg concentrations in prey items fed to nestling wood storks were measured in three colonies in Georgia (Gariboldi et al. 1998). The food items collected generally came from nestlings three to seven weeks old. Mean dietary Hg concentrations were 0.28, 0.10 and 0.19 mg/kg for an inland and two coastal colonies, respectively. Freshwater prey species had higher Hg concentrations, and the diet of the inland colony birds were entirely comprised of freshwater species. Mean nest success for the three colonies was 1.9, 2.58 and 2.5 fledged young per nest for the inland and coastal colonies, respectively. Because other factors that may influence reproductive success (e.g. differences in abundance of prey items) were not measured in this study, the authors could not conclude that dietary Hg exposure resulted in the lower reproductive success observed at the inland colony.

Kidney lesions were found in juvenile starlings (*Sturnus vulgaris*; omnivores) that consumed a commercial diet contaminated with 1.1 mg/kg Hg (Nicholson and Osborn 1984). The exposure concentration was converted to units of mg/kgBW/day using a body weight of 63.8 g (Terres 1980) and ingestion rate of 11% of body weight per day (7 g/day; Kenaga 1973), resulting in a LOAEL of 0.12 mg/kgBW/day and an estimated NOAEL of 0.012 mg/kgBW/day.

Goshawks (*Accipiter gentilis*) were fed a diet of chickens which had been fed methylmercury-dressed wheat (0.4 to 0.5 mg/kgBW/day) for five to six weeks and sacrificed (Borg *et al*. 1970). All chickens were clinically healthy at the end of the feeding period. The average Hg level in the chicken feed was 8 mg/kg, and in skeletal muscle of the chickens was 10 mg/kg. Muscle and liver from the chickens was fed to goshawks. Intake of Hg by the goshawks was 0.7 to 1.2 mg/kgBW/day (as reported by authors). Clinical symptoms of Hg poisoning appeared after two weeks. All birds were dead 47 days after the start of the experiment. Muscle Hg levels of the goshawks averaged 40 to 50 mg/kg, while brain Hg levels in the dead goshawks ranged from 30 to 40 mg/kg. This study was not used to derive a TRV for this risk assessment due to the small sample size of birds tested (two controls, four experimental).

Red-tailed hawks (*Buteo jamaicensis*) were fed chicks contaminated with methylmercury (Fimreite and Karstad 1971). The chicks were fed diets containing Panogen 15, a commercial seed treatment containing 2.5 % methylmercury dicyandiamide (MMD) at rates of 6, 12 and 18 mg/kg MMD for three weeks. Mercury levels measured in chick livers were 3.9, 7.2 and 10.0 mg/kg, respectively. Mean estimated intake of Hg by the three groups of hawks over the 12-week exposure period was 0.575 mg/day; 1.12 mg Hg/day; and 1.46 mg/day, respectively. Mortality occurred in hawks receiving the most contaminated diet (1.12 mg/kgBW/day) after an exposure period of one month or more. Exposure concentrations were converted to units of mg/kgBW/day using a red-tailed hawk body weight of 1.1 kg (Dunning 1993). Pathological changes noted in all hawks which received the highest Hg doses (1.12 and 1.46 mg/day, or 1.02 and 1.33 mg/kgBW/day, respectively) included swelling of axons of myelinated nerves in the spinal cord, and dilatation of myelin sheaths and loss of myelin. No adverse effects were observed in hawks which received 0.575 mg/day (0.52 mg/kgBW/day). A LOAEL of 1.02 mg/kgBW/day and a NOAEL of 0.52 mg/kgBW/day were calculated based on the results of this experiment.

Black ducks were fed diets containing methyl mercury at concentrations of zero or three mg/kg for 28 weeks (beginning 12 weeks before laying) during two consecutive breeding seasons (Finley and Stendall 1978). Dietary Hg exposure did not affect adult body weights or mortality. Hatchability of eggs and duckling survival were significantly lower for experimental birds in both breeding seasons. An ingestion rate of 0.125 kg/day (Heinz et al. 1989) and body weight of 1.25 kg (Dunning 1993) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 0.3 mg/kgBW/day and an estimated NOAEL of 0.03 mg/kgBW/day were calculated based on the results of this experiment.

Barr (1986) conducted a field study of common loons (*Gavia immer*) nesting on the Wabigoon-English River systems, areas affected by unpredictable water level fluctuations and Hg contamination. It was noted that nesting success of loons in this area was suppressed. Water level fluctuations due to the dams were ruled out as a causative factor, as decreased nesting success was observed in lakes experiencing only natural water level changes as well. A strong negative correlation was found between the successful use of territories by breeding loons and Hg contamination. A reduction in egg laying, and nest site and territorial fidelity were associated with mean Hg concentrations ranging from 0.3 to 0.4 mg/kg in prey, and from 2 to 3 mg/kg in adult brain tissue and eggs. Loons established few territories, laid only one egg, and raised no young where mean Hg in prey species exceeded 0.4 mg/kg. Non-Hg toxicants were found in loons and prey items at low levels, and were discounted as a major factor in the failure of loon reproduction. An ingestion rate of 1.5 kg/day and body weight of 4.5 kg (Alexander 1977) were used to convert the exposure concentration to units of mg/kgBW/day (LOAEL of 0.1 mg/kgBW/day).

Mallard ducks were fed diets containing methylmercury at concentrations of 0, 0.5 and 3 mg/kg for 12 months (Heinz 1974). The dry-mash concentrations of 0.5 and 3 mg/kg were equivalent to approximately 0.1 and 0.6 mg/kg, respectively, in a natural succulent duck diet. No treatment-related mortality was observed in adult birds. Number of eggs laid and hatching success were lower for birds exposed to Hg at a concentration of 3 mg/kg. The number of ducklings that died in the first week of life was also significantly higher for this group; histopathological analysis indicated the ducklings died from damage to nervous tissue in the cerebellum. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.066 mg/kgBW/day and a NOAEL of 0.01 mg/kgBW/day were calculated based on the results of this experiment.

For two consecutive years, mallard hens were fed diets containing methylmercury at concentrations of 0, 0.5 and 3 mg/kg (approximately 0.1 and 0.6 mg/kg on the basis of a natural succulent diet; Heinz 1976). No significant differences in egg production, number of eggs laid outside the nest box, or hatching success were observed. The percentage of normal ducklings that survived for one week was significantly lower for hens fed 3 mg/kg Hg. Brain lesions observed in dead ducklings at necropsy included demyelination, neuron shrinkage and necrosis. In avoidance tests, ducklings whose parents were fed 3 mg/kg Hg were hyper-responsive compared with controls and ducklings from parents fed 0.5 mg/kg Hg. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.066 mg/kgBW/day and a NOAEL of 0.01 mg/kgBW/day were calculated based on the results of this experiment.

Three generations of mallard ducks were fed either a diet containing methylmercury at a concentration of 0.5 mg/kg or a control diet (Heinz 1979). Mercury had no effect on adult body weight or weight changes during reproduction. Females exposed to dietary Hg laid a greater percentage of eggs outside the nest box, and also laid fewer eggs and produced fewer ducklings. Ducklings from Hg-exposed parents were hyper-responsive to a frightening stimulus in avoidance tests. An ingestion rate of 0.128 kg/day (cited by authors) and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.051 mg/kgBW/day and an estimated NOAEL of 0.0051 mg/kgBW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Hg to avian receptors.

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J.15.2 Toxicity to Mammals

Albanus *et al*. (1972) fed cats a diet composed of pike collected in a Hg-contaminated lake in Sweden. The methylmercury concentration of the diet was 6 mg/kg, or 0.45 mg/kgBW/day (cited by authors). Behavioral changes such as aggressiveness and stiff, waddling gaits were noted four to 11 days before the onset of convulsions, which developed between 60 and 83 days after the start of the experiment.

Five groups of cats were tested by Eaton *et al*. (1980). Three groups were fed ringed seal liver at concentrations of 4.8, 10.2, or 19.8 mg/kgBW/day. Only 3 % of the Hg in the seal liver was in the organic form methylmercury. Another group was fed beef liver spiked with methylmercuric chloride, at a dose of 0.25 mg/kgBW/day. A fifth group was fed uncontaminated beef liver. Evidence of Hg intoxication appeared only in the group of cats fed methylmercury-spiked beef liver. Animals began showing convulsions after 68 days, and mean survival period for the animals was 78 days.

Pregnant female cats were dosed with methylmercuric chloride administered in corn oil suspensions in gelatin capsules at concentrations of 0. 0.03, 0.083, and 0.25 mg/kgBW/day during days 10 through 58 of gestation (Khera 1973). At oral levels of 0.25 mg/kgBW/day, there was an increased incidence of abortion, fetal anomalies, and decreased cell density in the external granular layer of the cerebellum. Minimal or no embryopathic effects were observed at lower concentrations.

Cats were fed diets containing uncontaminated fish, methylmercury-contaminated fish at levels of 0.25 mg/kgBW/day, or dosed orally with gelatin capsules containing methylmercuric chloride dissolved in corn oil at a concentration of 0.25 mg/kgBW/day (Charbonneau *et al*. 1974). Clinical signs of Hg intoxication including ataxia, tremor and convulsions developed after 55 to 96 days of exposure in both treated groups. There was no significant difference in time to onset of symptoms of Hg intoxication, blood or tissue Hg concentrations, or time to death between cats receiving methylmercury-contaminated fish and those receiving methylmercuric chloride. Blood and brain Hg concentrations at which clinical signs of Hg intoxication appeared were 10 mg/kg and 10 mg/kg, respectively. No pathological changes were observed in the spinal cord or peripheral nerves, and no abnormalities were observed during chromosome studies of terminal bone marrow samples.

A commercial mink diet containing 5 µg/g methylmercury was lethal to adult mink in 30 days, while mink fed 10 µg/g inorganic mercuric chloride showed no adverse effects on survival or reproduction after five months (Aulerich *et al*. 1974). The exposure concentration was converted to units of mg/kgBW/day using an ingestion rate of 0.249 kg/day (U.S. EPA 1993) and a body weight of 1.13 kg (Merritt 1987). A LOAEL of 1.1 mg/kgBW/day was calculated for methylmercury, and a NOAEL of 2.2 mg/kgBW/day was calculated for inorganic Hg based on the results of this experiment.

Adult female mink were fed commercial diets containing 1.1, 1.8, 4.8, 8.3 and 15.0 µg/g Hg as methylmercuric chloride for a 93-day period (Wobeser *et al*. 1976). Signs of Hg intoxication were seen in mink fed 1.8 µg/g mercuric chloride (0.4 mg/kgBW/day; converted to units of mg/kgBW/day using conversion factors cited above) and greater. Signs of intoxication were anorexia, weight loss, ataxia, splaying of the hind legs, irregular vocalization and convulsions. The rapidity of the onset of clinical intoxication was directly related to the Hg content of the diet. Mercury levels in tissues of animals which died were similar, despite differences in dietary intake levels and times of death. The mean concentrations of Hg mg/kg in tissues were: brain, 11.9; muscle, 16.0; kidney, 23.1; and liver, 24.3. A LOAEL of 0.4 mg/kgBW/day and a NOAEL of 0.24 mg/kgBW/day was calculated for based on the results of this experiment.

In contrast, Jernalov *et al*. (1976) fed adult female mink a diet containing Hg-contaminated pike for a 100-day period. The concentration of methylmercury in the pike was 5.7 mg/kg, and pike comprised 40 % of the total diet by weight. Based on an adult body weight of 1.13 kg and ingestion rate of 0.249 kg/day, the mink were exposed to a dietary level of 0.5 mg/kgBW/day. The mink showed no symptoms of poisoning and their behavior was unchanged throughout the experimental period.

Ranch-bred mink were maintained in outside cages and fed diets containing methylmercury at concentrations of 0 or 1.0 µg/g (0.22 mg/kgBW/day) for 8 months (Wren et al. 1987a and 1987b). Fertility of adult mink, percentage of females whelped, number of kits per female, growth rate of kits, and kit survival to weaning were not affected by Hg exposure. Unexpected mortality of mink was observed during a cold snap; clinical signs elicited by the animals prior to death were consistent with methylmercury intoxication (weakness, splaying of the hind legs, tremors and loss of appetite). Although mortality had not been observed in previous experiments at this exposure concentration, the authors attributed the observed mortality to a combination of cold stress and Hg exposure.

It is difficult to determine the reason for the apparent discrepancy in levels of Hg which produced toxic effects in the above studies. Actual Hg concentration in the diet was not analyzed in the first two studies, and only the pike portion of the diet was analyzed by Jernalov *et al*. (1976). The portion of diet comprised of fish differed in all three studies, and Se levels were only analyzed by Jernalov *et al*. (1976). Fish tissue is generally high in Se, which protects organisms from Hg toxicity (Cuvin-Aralar and Furness 1991, Stoewsand *et al*. 1974), and also reduces assimilation of Hg from food by 5 to 10 % (Turner and Swick 1983).

Female mink were fed diets containing 0.1, 0.5 and 1.0 mg/kg total Hg (Dansereau et al. 1999). Piscivorous and nonpiscivorous fish naturally contaminated with organic Hg were used to prepare the experimental diets. No negative control was used in this study due to the inability to find a freshwater fish diet uncontaminated by Hg. First generation females (G1) were exposed to the diets for approximately 400 days, and their female offspring (G2) were exposed to the diets for approximately 300 days. All females were mated to males that were fed the diet containing 0.1 mg/kg Hg for 60 days prior to the mating season. Mercury exposure did not affect length of gestation period, number of kits, survival or growth of neonatal kits. There was an inverse relationship between whelping proportion and exposure concentration, but this was not statistically significant. High mortality was observed in G1 females (60 %) and G2 females (86 %) fed the 1.0 mg/kg Hg diet. The exposure concentrations were converted to units of mg/kgBW/day using an ingestion rate of 0.249

kg/day (U.S. EPA 1993) and a body weight of 1.13 kg (Merritt 1987). A LOAEL of 0.22 mg/kgBW/day and a NOAEL of 0.11 mg/kgBW/day were calculated based on the results of this experiment.

Methylmercury was added to diets of male river otters at levels of 2, 4, and 8 mg/kg Hg (O'Conner and Nielson 1980). Control animals were healthy for the entire study period, but otters exposed to Hg in the diet had mean survival times of 184, 117 and 57 days, respectively. Tissue concentrations at time of death were similar, although dietary levels differed. The exposure concentrations were converted to units of mg/kgBW/day (0.25, 0.50 and 1.00 mg/kgBW/day, respectively) using an ingestion rate of 0.8 kg/day and body weight of 6.35 kg (Harris 1968). A LOAEL of 0.25 mg/kgBW/day and an estimated NOAEL of 0.025 mg/kgBW/day were calculated based on the results of this experiment.

Rats were exposed to dietary methylmercuric chloride at concentrations of 0.1, 0.5 and 2.5 mg/kg for three generations (Verschurren et al. 1976). Pup viability was significantly reduced in the group exposed to a concentration of 2.5 mg/kg. An ingestion rate of 0.028 kg/day and body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.16 mg/kgBW/day and a NOAEL of 0.032 mg/kgBW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Hg to mammalian receptors.

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J.16 Molybdenum

J.16.1 Toxicity to Birds

White Rock hens were fed diets containing molybdenum (Mo) (as sodium molybdate dihydrate) at concentrations of 0, 500, 1,000, or 2,000 mg/kg for 21 days (Lepore and Miller 1965). Egg production, weekly body weight, and egg Mo concentrations were measured. All hens fed diets containing Mo lost weight; the weight loss was significant in the 2,000 mg/kg exposure group. Egg production decreased as Mo exposure concentrations increased. Hens that were fed Mo at concentrations of 500, 1,000 and 2,000 mg/kg produced 15%, 50% and 80% fewer eggs than controls birds, respectively. Egg production by hens fed the 2,000 mg/kg diet ceased after six days on the experimental diet. In a second experiment, hens were fed diets containing Mo at concentrations of 0 or 500 mg/kg for 21 days. Embryo viability was measured by periodic candling of the eggs to 19 days of incubation. The hens fed Mo in their diet laid about 80% as many eggs as the control hens. One hundred percent embryo mortality was observed by day 9 of this experiment. Embryo death occurred when the egg Mo concentration exceeded 17 mg/kg. A body weight of 1.45 kg and an ingestion rate of 0.103 kg/day (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 500 mg/kg was identified based on reduced egg production and embryo mortality. A LOAEL of 35.5 mg/kgBW/day and an estimated NOAEL of 3.55 mg/kgBW/day were calculated based on results of this experiment. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Mo to avian receptors.

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J.16.2 Toxicity to Mammals

Adult male Druckery rats were administered oral doses of sodium molybdate at concentrations of 0, 10, 30, and 50 mg/kg body/day (five days per week) for 60 days (Pandey and Singh 2002). Mortality, body weight, organ weights, sperm count, motility, and sperm abnormalities were measured. No significant effects on weight gain or absolute organ weights were observed. A significant dose-dependant decrease in sperm motility, total epididymal sperm count, and an increase in abnormalities were observed in rats exposed at concentrations of 30 and 50 mg/kgBW/day. In a second experiment, male rats were administered oral doses of sodium molybdate at concentrations of 0 or 30 mg/kgBW/day (five days per week) for 60 days prior to mating with untreated females. Fertility of Mo-exposed males was 60 %, compared to 80 % for control males. The number of implantations was significantly reduced in females mated to Mo-exposed males, and fetal crown-rump length was significantly reduced. Based on this experiment, a LOAEL of 30 mg/kgBW/day and a NOAEL of 10 mg/kgBW/day were identified.

Mice were exposed to Mo in drinking water at concentrations of 0 or 10 mg/L for 3 generations (Schroeder and Mitchener 1971). The Mo concentration in the diet was 0.45 mg/kg. Reproductive success was reduced in Mo-exposed mice, and a high incidence of runts was observed. A food consumption rate of 0.0055 kg/day, a water consumption rate of 0.0075 L/day, and a body weight of 0.03 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. Intake from food was 0.0825 mg/kgBW/day, and intake from water was 2.5 mg/kgBW/day, for a total exposure concentration of 2.58 mg/kgBW/day. Based on the observed reproductive effects, a LOAEL of 2.58 and an estimated NOAEL of 0.258 were calculated for Mo.

Long Evans rats were fed diets supplemented with sodium molybdate at concentrations of 0, 20, 80 and 140 mg/kg from weaning through reproduction (Jeter and Davis 1954). The Mo content of the basal diet was less than 1 mg/kg. Growth was measured from weaning through 11 weeks of age. Growth of males was significantly reduced at all exposure concentrations, and growth of females was significantly reduced at exposure concentrations of 80 and 140 mg/kg. Seventy five percent of the males fed diets containing 80 and 140 mg/kg Mo were infertile; male infertility was confirmed by pairing treated males with untreated females. Histological examination of male testes revealed seminiferous tubule degeneration; testes from control rats were normal. Female rats fed diets containing 80 and 140 mg/kg Mo lost weight during lactation, and weaning weights of litters were reduced. Food consumption by females was not affected by Mo supplementation. Based on the reduction in male growth, a LOAEL of 20 mg/kg was identified. A body weight of 0.214 kg and ingestion rate of 0.02 kg/day (U.S. EPA 1988; exposure factors for Long Evans rats 0 to 90 days of age) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1.9 mg/kgBW/day and an estimated NOAEL of 0.19 mg/kgBW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (growth) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Mo to mammalian receptors.

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J.17 Nickel

J.17.1 Toxicity to Birds

Day-old Hubbard broiler chicks were fed diets containing nickel (Ni) (as nickel sulfate or nickel acetate) at concentrations of 0, 100, 300, 500, 700, 900, 1,100 and 1,300 mg/kg for four weeks (Weber and Reid 1967). Growth of chicks was significantly reduced at dietary concentrations of 700 mg/kg and greater. A food ingestion rate of 0.0126 kg/day and body weight of 0.121 kg (cited for 14-day old chicks, U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 72.9 mg/kgBW/day and a NOAEL of 52 mg/kgBW/day were calculated based on the results of this experiment. Results from this experiment were not used to derive a TRV for this risk assessment as growth is not considered an ecologically significant endpoint.

Mallard ducklings were exposed to 0, 176, 774 and 1,069 mg/kg Ni diet for 90 days (Cain and Paifford 1981). No effects on growth or mortality were observed in ducklings exposed to up to 774 mg/kg Ni as nickel sulfate. Seventy percent mortality was observed in the group of ducklings which received the diet containing 1,069 mg/kg. An ingestion rate of 0.0578 kg/day (Sugden et al. 1981) and body weight of 0.782 kg (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 79 mg/kgBW/day and a NOAEL of 57.2 mg/kgBW/day were calculated. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Ni to avian receptors.

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J.17.2 Toxicity to Mammals

Female B6C3F1 mice were exposed to nickel sulfate in drinking water at concentrations of 0, 1,000, 5,000 and 10,000 mg/L for 180 days (0, 115.7, 285.7 and 395.7 mg/kgBW/day; Dieter et al. 1988). Minimal to mild nephrosis was observed in mice from the two highest exposure concentrations, and thymic atrophy was found in all Ni-exposed mice. A LOAEL of 115.7 mg.kgBW/day and an estimated NOAEL of 11.6 mg/kgBW/day were calculated based on the results of this experiment.

Wistar rats were exposed to dietary Ni (as nickel sulfate hexahydrate) at concentrations of 0, 250, 500, 1,000 or 2,500 mg/kg for three generations (Ambrose et al. 1976). No adverse effects on fertility, gestation, viability and lactation indices were observed at any dietary concentration of Ni tested. Number of siblings cast per litter and weaned per litter decreased with increasing Ni concentration; however, no statistical analysis was conducted by the authors for these endpoints. Offspring growth was significantly reduced in rats exposed at concentrations of 1,000 and 2,500 mg/kg. An ingestion rate of 0.027 kg/day and body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 77 mg/kgBW/day (1,000 mg/kg) and a NOAEL of 39 mg/kgBW/day (500 mg/kg) were calculated based on the results of this experiment.

Nickel chloride was administered in drinking water to pregnant mice (CD-1 strain) from the 2^{nd} through the 17^{th} day of gestation at concentrations of 0, 500 or 1,000 mg/L (0, 80 and 160 mg/kgBW/day, respectively; as cited by authors; U.S. EPA 1983). Exposure to Ni at a concentration of 1,000 mg/L resulted in significantly fewer pregnancies, lower fetal body weight, and lower maternal body weights. No fetal or maternal effects were observed in the 500 mg/L group. A LOAEL of 160 mg/kgBW/day and a NOAEL of 80 mg/kgBW/day were calculated based on the results of this experiment.

Rats were exposed to nickel chloride in drinking water at concentrations of 0, 50, 250 and 500 mg/L for two generations (Kimmel et al. 1986). At an exposure concentration of 500 mg/L, adult and pup body weights were reduced, and the number of live pups per litter throughout lacatation was reduced. No effects on number of pregnancies, fertility, or number of live litters were observed at any exposure concentration. A greater effect on reduced pup weight and number of live pups through lacatation was observed in the second generation. A water ingestion rate of 0.0435 L/day and a body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 62 mg/kgBW/day and a NOAEL of 31 mg/kgBW/day were calculated based on the results of this experiment.

Nickel chloride was administered to CD rats in drinking water at concentrations of 0, 50, 250 or 500 mg/L for two generations (Price et al. 1988). Among pregnant females, reduced body weight and increased mortality were observed at the higher exposure concentrations during late gestation, parturition and lactation. Water intake was also significantly reduced, making it difficult to separate direct effects of Ni on dams from indirect effects associated with reduced water intake. Adverse effects on offspring were observed during the perinatal and postnatal periods, rather than during gestation. Significant reductions in live litter size and postnatal body weight of the F_2 litters were observed in the group exposed to Ni at a concentration of 500 mg/L. Nickel consumption during gestation of the F2 litter was 23.1 and 42.1 mg/kgBW/day for the 250 and 500 mg/L exposure groups, respectively (reported by authors). A LOAEL of 42.1 mg/kgBW/day and a NOAEL of 23.1 mg/kgBW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Ni to mammalian receptors.

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J.18 Selenium

J.18.1 Toxicity to Birds

Black-crowned night herons were fed diets containing Se as selenomethionine at concentrations of 0 and 10 mg/kg for 13 days prior to egg laying (Smith et al. 1988). Hatching success, organ weights, hemoglobin concentration, hematocrit and eggshell thickness did not differ between controls and experimental birds. Developmental malformations commonly associated with Se exposure were not observed in heron embryos or hatchlings. An ingestion rate of 0.161 kg/day (Kushlan 1978) and body weight of 0.883 kg (Dunning 1993) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 1.8 mg/kgBW/day and an estimated LOAEL of 18.0 mg/kgBW/day were calculated based on the results of this experiment.

A feeding study with mallard ducks was conducted to identify diagnostic criteria for Se toxicosis in birds (Albers et al. 1996). One-year old male mallards were fed diets containing 0, 10, 20, 40 or 80 mg/kg Se as seleno-DL-methionine for 16 weeks. All ducks receiving diets containing 80 mg/kg died; 15 % of the birds fed 40 mg/kg Se died. Food consumption and body weight were significantly decreased in birds that received the 40 mg/kg Se diet; muscular atrophy, delayed molt, sloughed or broken claws and loss of feathers from the head and neck were also observed in this group. Testis weights were significantly decreased in the males which received the 20 mg/kg diet. Proposed diagnostic criteria for non-fatal chronic selenosis were low body weight due mostly to loss of breast muscle mass, poor plumage, delayed molt, a liver Se concentration that exceeds 66 mg/kg dry weight, reduced hatching success or an increased number of musculoskeletal abnormalities in embryos, or eggs that have a concentration of Se exceeding 10 mg/kg dry weight. An ingestion rate of 0.139 kg/day and adult body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 2.2 mg/kgBW/day (20 mg/kg; effects on testis) and a NOAEL of 1.1 mg/kgBW/day (10 mg/kg) were calculated based on the results of this experiment.

American kestrels were fed diets containing Se (as selenomethionine) at concentrations of 0, 6 or 12 mg/kg (dry weight) for 11 weeks (Santolo et al. 1999). No differences in egg production, hatchability, or incidence of embryonic malformations were observed in any treatment group. Fertility was significantly lower in birds fed diets containing 12 mg/kg Se as compared to control birds. To convert the dietary concentration from dry to wet weight, a percent moisture content of 32 % (mean water content for small mammals; Sample and Suter 1994) was assumed, resulting in dietary exposure concentrations of 4.08 and 8.16 mg/kg. An ingestion rate of 0.0307 kg/day (Barrett and Mackey 1975) and body weight of 0.111 kg (Dunning 1993) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 2.26 mg/kgBW/day and a NOAEL of 1.13 mg/kgBW/day were calculated based on the results of this experiment.

Wiemeyer and Hoffman (1996) evaluated dietary toxicity of Se (as selenomethionine) to Eastern screech owls. Owls were fed diets containing 0, 4.4 or 13.2 mg/kg Se (wet weight). Laboratory analysis of the diets confirmed the following exposure concentrations: not detected (ND) to 0.13 mg/kg for the control group, and 3.53 and 12 mg/kg for the two exposure groups. Adult body weight, number of eggs laid per pair, number of eggs hatched per pair, and number of nestlings surviving to five days were significantly lower for birds which received the highest dose. Control and low dosage birds did not differ in adult body weight, food consumption, or reproductive parameters. An ingestion rate of 0.025 kg/day (Pattee et al. 1988) and adult body weight of 0.185 kg (Dunning 1993) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1.62 mg/kgBW/day and a NOAEL of 0.48 mg/kgBW/day were derived based on the results of this study.

Mallard ducks were fed diets containing Se as selenomethionine at concentrations of 0 and 10 mg/kg for 41 days prior to egg laying (Heinz et al. 1987). Birds exposed to dietary Se produced fewer young and had a higher incidence of abnormal embyros than controls. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 1.11 mg/kgBW/day and an estimated NOAEL of 0.11 mg/kgBW/day were calculated based on the results of this experiment.

Heinz et al. (1989) evaluated dietary toxicity of organic Se as selenomethionine to mallard ducks. Ducks were exposed to diets containing 0, 1, 2, 4, 8 or 16 mg/kg Se diet (wet weight) for 100 days. Reduced duckling survival was observed in groups fed diets containing 8 mg/kg Se. Diets containing 8 and 16 mg/kg Se caused malformations in 6.8 and 67.9 %, respectively, of unhatched eggs compared with 0.6 % for controls. An ingestion rate of 0.10 kg/day and body weight of 1.0 kg (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.8 mg/kgBW/day and a NOAEL of 0.4 mg/kgBW/day were calculated. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Se to avian receptors.

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J.18.2 Toxicity to Mammals

Male house rats (*Rattus rattus*) were fed diets containing Se (as sodium selenite) at concentrations of 0, 2 and 4 mg/kg for 5 weeks (Kaur and Parshad 1994). Ingestion of a diet containing Se at 4 mg/kg caused a significant decrease in sperm concentration, motility, the percentage of live spermatozoa, and testicular and cauda epididymal weight. A dose-dependant effect of Se on sperm morphology was observed; sperm from rats fed 2 mg/kg and 4 mg/kg dietary Se had three and 20 times more abnormalities than sperm from control rats, respectively. An ingestion rate of 0.016 kg/day (U.S. EPA 1988; value cited for 150 g Fischer 344 rats) and body weights of 0.14 and 0.15 kg (cited by authors for rats from the 4 and 2 mg/kg groups, respectively) were used to convert the exposure units to mg/kgBW/day. A LOAEL of 0.46 mg/kgBW/day and a NOAEL of 0.21 mg/kgBW/day were calculated based on the results of this experiment.

Rosenfeld and Beath (1954) evaluated toxicity of Se in drinking water to rats. Rats were exposed to potassium selenate at concentrations of 1.5, 2.5 and 7.5 mg/L for one year. No adverse effects on reproduction were observed among rats exposed to 1.5 m/L Se, but the number of second generation young was reduced by 50 % in the group exposed to 2.5 mg/L. An ingestion rate of 0.046 L/day and body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 0.33 mg/kgBW/day and a NOAEL of 0.20 mg/kgBW/day were calculated based on the results of this experiment.

Long-Evans rats were given drinking water containing Se (either as sodium selenite or sodium selenate) at concentrations of 0 or 2 µg/ml for 180 days (Schroeder 1967). Mice (Charles River CD strain) were given selenite in drinking water at a concentration of 0 or 2 µg/ml for 360 days. Increased mortality was observed in rats given selenite in drinking water (58 and 30 % after two months for males and females, respectively). Livers of rats that died were grossly abnormal, with fatty infiltration and degeneration, and cellular atrophy. No adverse effects were observed in mice. A water ingestion rate of 0.053 L/day and body weight of 0.43 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. Based on the mortality observed in rats, a LOAEL of 0.25 mg/kgBW/day and an estimated NOAEL of 0.025 mg/kgBW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (survival) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Se to mammalian receptors.

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J.19 Silver

J.19.1 Toxicity to Birds

One-day old ducklings were fed diets containing no silver (Ag) , 0.2 % Ag (as silver acetate), 0.2 % Ag and 200 IU/g vitamin E, or 0.2 % Ag and 1.0 mg/kg Se (Van Vleet 1977). Ducklings fed Ag alone or Ag and Se developed characteristic clinical signs and pathologic alterations of Se-vitamin E deficiency. Affected birds were anorexic, growth was reduced, and were reluctant to stand; mortality was observed. Lesions observed at necropsy included myopathy of the gizzard, intestine, skeletal muscles, and heart and hydropericardium. No adverse effects were observed in the ducklings fed the Ag supplemented with vitamin E diet. A food ingestion rate of 0.0417 kg/day and a body weight of 0.197 kg (Sugden et al. 1981) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 423.4 mg/kgBW/day and an estimated NOAEL of 42.3 mg/kgBW/day were calculated based on the results of this experiment.

Day-old turkey poults were fed a diet containing 900 mg/kg Ag as silver nitrate for four weeks (Peterson et al. 1973). Body weight gain, hemoglobin, packed cell volume and aortic elastin content were significantly reduced, and the ratio of heart wet weight to body weight ratio was significantly increased. After four weeks, birds were returned to a clean diet for 18 weeks, and weight gain and hemotological factors returned to normal. Surviving birds were sacrificed at 22 weeks of age, and the hearts were visibly abnormal. Six birds died during the later stages of the development period; grossly enlarged hearts with marked dilatation of the right ventricle were observed at necropsy. A food ingestion rate of 0.048 kg/day (ingestion rate for two to three weeks old turkeys cited in the Salisbury Poultry Product Use Guide) and body weight of 422 g (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 102 mg/kgBW/day and an estimated NOAEL of 10.2 mg/kgBW/day were calculated based on the results of this experiment.

Day-old Large White turkey poults were fed diets containing 0, 100, 300 or 900 mg/kg Ag as nitrate or acetate for four weeks (Jensen et al. 1974). The highest concentration of Ag (900 mg/kg) reduced growth rate, packed cell volume, hemoglobin, and caused cardiac enlargement. Degeneration of the gizzard musculature was also observed at this dose level. A food ingestion rate of 0.048 kg/day (ingestion rate for two to three weeks old turkeys cited in the Salisbury Poultry Product Use Guide) and body weight of 316 g (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 137 mg/kgBW/day and a NOAEL of 46 mg/kgBW/day were calculated based on the results of this experiment.

Day-old Hubbard broiler chicks were fed a diet containing 900 mg/kg Ag (as silver nitrate) for 28 days (Peterson and Jensen 1975a). Exposure to dietary Ag significantly depressed growth, and increased heart wet weight to body weight ration and mortality (35 % mortality observed). Supplementing the diet with 50 mg/kg Cu prevented heart enlargement and mortality, but only partially corrected growth depression. A food ingestion rate of 0.0126 kg/day (ingestion rate cited for 14-day old chickens, U.S. EPA 1988) and body weight of 286 g (cited by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 39.7 mg/kgBW/day and an estimated NOAEL of 3.97 mg/kgBW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (growth) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Ag to avian receptors.

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J.19.2 Toxicity to Mammals

Rats were fed diets containing Ag at concentrations of 0, 6 and 130 mg/kgBW/day for 12 weeks (Smith and Carson 1977). Mortality due to hepatocellular necrosis and muscular dystrophy were observed in rats exposed to the highest concentration. The adverse effects due to Ag exposure could be prevented by supplementing the diet with vitamin E.

Rats were exposed to Ag in drinking water at concentrations of 0, 20 and 1,500 mg/L for 6 months (Smith and Carson 1977). At an exposure concentration of 20 mg/L, the only effects observed were increased brain deoxyribonucleic and ribonucleic acids (DNA and RNA). Liver necrosis and death were observed in rats exposed to 1,500 mg/L Ag. A water ingestion rate of 0.0435 L/day and a body weight of 0.35 kg (U.S. EPA 1988) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 186.4 and a NOAEL of 2.49 mg/kgBW/day were calculated based on the results of this experiment.

Pregnant female albino rats were fed diets supplemented with silver chloride at a concentration of 0 or 50 mg/animal/day for days 7 to 15 of pregnancy or throughout gestation (Shavloski et al. 1995). No alterations of physiological functions of the adult rats were observed; however, Cu-containing ceruloplasmin was eliminated from the blood plasma. Exposure to Ag from day 7 to 15 of gestation (the period of organogenesis) did not affect embryo development or post-implantation mortality. In animals exposed to the Ag-supplemented diet throughout pregnancy, developmental abnormalities of embryos, prenatal death, or 100 % mortality of newborns in the first 24 hours of life were observed. Copper content of placental and fetal tissues was significantly decreased. In a follow-up experiment, embryotoxicity was significantly diminished by repetitive injections of native ceruloplasmin to the pregnant rats. The authors suggested that the embryotoxic effect of Ag is caused by its ability to interfere with Cu metabolism, in particular by altering the Cu-transporting function of ceruloplasmin. A body weight of 0.19 kg (cited by authors) was used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 263 mg/kgBW/day and an estimated NOAEL of 26.3 mg/kgBW/day were calculated based on the results of this experiment.

The lower motor neurons of the brainstem and spinal cord are primary sites of Ag deposition in small mammals exposed to Ag (Rungby and Danscher 1984), therefore effects of Ag on open field behavior of mice was evaluated in this experiment. Sixty-day old female mice of the NMRI strain were exposed to silver nitrate in drinking water at concentrations of 0 and 0.015 % for 125 days. Ten days after termination of Ag exposure, animals were tested individually in an open field cage. Activity was measured as the number of fields entered plus the total number of times the animal reared, leaned, washed, defecated or urinated per minute. Total activity levels were significantly lowered in Ag exposed rats ($P < 0.01$) compared to the controls. The mechanisms underlying the lowered activity levels could not be determined by this experiment, but the observed hypoactivity could be due to a direct effect of Ag on motor systems or from altered reactions to internal or external stimuli due to altered sensory or integrative functions. The average daily Ag intake during the 125-day exposure period was 0.09 mg per mouse. An adult body weight of 0.033 kg (U.S. EPA 1988) was used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 2.7 mg/kgBW/day and an estimated NOAEL of 0.27 mg/kgBW/day were calculated based on the results of this experiment; these values will be used to evaluate risk from exposure to Ag for mammals.

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J.20 Thallium

J.20.1 Toxicity to Birds

To test the acceptability of thallium (Tl) poisoned grain (used by ranchers and orchardists to control rodents) to wild birds, three female mallards were caged together and fed 200 g of California Tl-poisoned barley, which contained 1,800 mg of thallium sulfate (9000 mg/kg; Ward 1931). There was no other food in the cage. Two days later, two ducks died; only 45 g of the food had been consumed (7.5 g/duck/day). An adult body weight of 1.25 kg was used to convert exposure concentrations to units of mg/kgBW/day (Piccirillo and Quesenberry 1980). An estimated LOAEL of 600 mg/kgBW/day (lethal dose of 6,000 mg/kg converted to a LOAEL using a factor of 10) was calculated based on this experiment.

Three immature golden eagles were given single doses of thallium sulfate in a gelatin capsule (Bean and Hudson 1976). One bird (body weight 2.8 kg) was given a dose of 60 mg/kg, while the other two birds (body weights 3.2 and 4.6 kg) were given 120 mg/kg. Clinical signs of intoxication observed included loss of coordination, imbalance, hypoactivity, and loss of appetite. Symptoms increased in severity in birds 2 and 3 until death, at days 6.5 and 4.5 after treatment. The third bird recovered four days following treatment. The exposure concentrations for the three birds were 21.4, 37.5 and 26.1 mg/kgBW. A LOAEL of 2.61 (lethal dose of 26.1 mg/kgBW converted to a LOAEL using a factor of 10) was identified from this experiment.

Shaw (1933) evaluated the minimum lethal dose (M.L.D.) of Tl using domestic mallards, wild white geese, and quail. Ducks and geese were administered a single oral dose of thallium sulfate in a capsule or as a coating on grain. Quail were fed bread containing known amounts of Tl as thallium sulphate (single dose; days to death was the endpoint measured). Any uneaten portions were deducted from the total amount offered. Mallard ducks were given doses ranging from 20 to 200 mg/kgBW. The bird that received the 20 mg/kgBW dose survived; all birds receiving doses of 30 mg/kgBW or greater died. Thalllium administered in solid form as a capsule acted more rapidly than Tl administered as a coating on grain. Geese received doses ranging from 15 to 48 mg/kgBW, and quail received doses ranging from 12 to 82 mg/kgBW. All birds from these two species died within 13 days of administration of the Tl. An M.L.D of 30 mg/kgBW , less than 15 mg/kgBW, and less than 12 mg/kgBW was determined for mallards, geese and quail, respectively. The author determined that for geese and quail 0.2 % of the body weight in poisoned grain will contain a lethal dose, and for ducks 0.4 % of the body weight in poisoned grain will be a lethal dose (Tl treated barley used as a rodenticide prepared according to the Biological Survey formula contains one pound of thallium sulfate per 100 pounds barley, or about 0.8 % metallic Tl; Shaw 1932). It should be recognized that sample sizes tested in this experiment were small, and the only endpoint measured was mortality. One hundred percent mortality was observed in geese and quail at the lowest exposure concentration tested.

No studies evaluating chronic toxicity of Tl to birds were located; therefore, the feeding study conducted with quail will be used to derive the TRV for this risk assessment. An estimated LOAEL of 1.2 mg/kgBW/day (single oral lethal dose converted to a LOAEL using a factor of 10) and an estimated NOAEL of 0.12 mg/kgBW/day will be used to evaluate toxicity of Tl to birds for this risk assessment.

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J.20.2 Toxicity to Mammals

Thallium (as thallium chloride and thallium acetate) was administered orally to female NMRI mice and Wistar rats at concentrations of 0, 3 and 6 mg/kgBW/day from day 6 to day 15 of pregnancy (Roll and Matthiaschk 1981). In mice, no malformations of the skeleton or internal organs were observed in offspring from females exposed to either form of Tl at any concentration. A slight increase in postimplantive loss and a decrease in weight at birth was observed at an exposure concentration of 6 mg/kgBW/day thallium chloride. Exposure to either compound at a concentration of 3 mg/kgBW/day did not cause any embryotoxic effects in rats. Maternal toxicity was observed in rats exposed to the highest concentration of either compound. Based on the effects observed in rats, a LOAEL of 6 mg/kgBW/day and a NOAEL of 3 mg/kgBW/day were the results of this experiment.

Rats were exposed to Tl (as thallium sulfate) in drinking water at an exposure concentration of 10 mg/L for 60 days (Formigli et al. 1986). There was a significant reduction in sperm motility in rats exposed to Tl compared to a control group. Degenerative changes in Sertoli cells (cells that are the main regulators of normal spermatogenesis) were observed in Tl-treated rats, but not in control animals. A mean daily intake of 270 µg Tl/rat and body weight of 0.365 kg (cited by authors) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 0.74 mg/kgBW/day and an estimated NOAEL of 0.074 mg/kgBW/day were calculated based on the results of this experiment. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Tl to avian receptors.

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Roll, R. and G. Matthiaschk. 1981. Investigations on embryotoxic effects of thallium chloride and thallium acetate in mice and rats. Teratology. 24(2):46A-47A.

J.21 Uranium

J.21.1 Toxicity to Birds

Kupsh et al. (1991) evaluated renal damage in Japanese quail exposed to uranyl nitrate. Uranyl nitrate solution at concentrations of 0.15 or 50 micromoles per kilogram (µMol/kg) BW as uranium (U) was administered intravenously. Eighteen hours later, the quail were sacrificed and the kidneys were examined. Severe damage was observed in the quail exposed to a U concentration of 50 µMol/kg body weight, particularly in the distal tubules. Glomerular damage was marked in quail kidneys, with atrophy, necrosis, and proteinuria. Due to the exposure route, this study was not used to derive a TRV for U to birds. Only studies that evaluated oral exposure to U were used to derive a TRV for this risk assessment, which is evaluating dietary exposure to contaminants of concern.

Three-week old Leghorn chicks were injected with 0 or 250 mg uranyl nitrate/kg BW (Mollenhauer et al. 1986). Dosages were administered subcutaneously at the base of the neck. Degenerative changes were observed in kidneys of U-treated birds, and were present in the proximal and distal tubules and collecting ducts. Kidneys of chickens, like those of mammals, were confirmed as a site of U storage. Due to the exposure route, this study was not used to derive a TRV for U to birds.

One-day old Leghorn cockerels (Hy-Line, W-36) were administered doses of uranyl nitrate by subcutaneous injection at concentrations of untreated controls, saline controls, 70, 100, 130, 160, 190, 220, 250, 280, 310, 340, 370, 400, 430, or 460 mg UN/kg BW (Harvey et al. 1986). Mortality was monitored for seven days and an LD_{50} value was calculated. The lowest dose that resulted in mortality was 160 mg/kg BW. The 7-day LD_{50} for uranyl nitrate was 235 mg/kg BW. Microscopic examination revealed mild focal proximal convulated tubular degeneration in kidneys within 12 hours of injection. At 48 hours, renal lesions included moderate to severe nephrosis, cellular and protein casts, and some regeneration. By 96 hours, no major lesions in kidneys were observed. Severe hepatic necrosis was present in liver sections. Due to the exposure route, this study was not used to derive a TRV for U to birds.

Japanese quail were given intravenous injections of UCl_3 or $OU(NO_3)$ at a concentration of 1.5 µmol/100g to evaluate distribution in tissues and eggs (Robinson et al. 1984). Whole body losses 18 hours following injection were 24% for females and 72% for males. Cumulative deposition in yolks of eggs laid over 8 days following injection were 1.9% for U(III) and 1.7% for U(VI). Marked deposition of U was observed in leg bones of female quail [12.5% for U(III) and 14.1% for U(VI)]. Tissue distribution was the only effect measured in this experiment. Due to the exposure route, this study was not used to derive a TRV for U to birds.

American black ducks were fed diets containing powdered U at concentrations of 0, 25, 100, 400 or 1,600 mg/kg for 6 weeks (Haseltine and Sileo 1983). One male in the 100 mg/kg treatment group died during the experiment, but pathological kidney changes associated with U toxicity in mammals were not observed; the authors did not attribute the death to U exposure. Treatment-related weight loss was not observed at any exposure concentration. No significant gross or microscopic lesions were observed in birds exposed at any concentration. Examination of the kidneys did not reveal any lesions in the distal third of the proximal convoluted tubule, which is characteristic of U exposure in mammals. A body weight of 1.25 kg (Dunning 1993) and an ingestion rate of 0.125 kg/day (Heinz *et al.* 1989) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 160 mg/kgBW/day and an estimated LOAEL of 1600 mg/kgBW/day will be used to evaluate the toxicity of U to avian receptors.

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Heinz, G. H., D. J. Hoffman and L. G. Gold (1989). "Impaired reproduction of mallards fed an organic form of selenium." J. Wildl. Manage. **53**: 418-428.

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J.21.2 Toxicity to Mammals

Acute toxicity of U to male Sprague-Dawley rats and male Swiss mice was evaluated by (Domingo *et al*. 1987). Single doses of uranyl acetate were administered by subcutaneous injection or orally via gavage. Oral and subcutaneous exposure concentrations for rats were 0, 20, 40, 80, 160, 320, 640 or 1,280 mg/kg and 0, 1.25, 2.5, 5, 10, 20, or 40 mg/kg. Exposure concentrations for mice were 0, 44, 80, 144, 259, 466, or 839 mg/kg and 0, 10, 15, 22.5, 33 or 50 mg/kg. For animals whose exposure was via gavage, LD_{50} concentrations were 204 and 242 mg/kg for rats and mice, respectively. The LD_{50} values for subcutaneous exposure were much lower, 8.3 mg/kg for rats and 20.4 mg/kg for mice.

Sprague-Dawley rats were given uranyl nitrate hexahydrate in drinking water at concentrations of 0, 0.96, 4.8, 24, 120 or 600 mg/L for 91 days (Gilman *et al*. 1998a). At the end of the study, animals were euthanized and hematological, biochemical and histopathological analyses were conducted. No significant differences in weight gain, food consumption, or water intake were observed at any exposure concentration. Significant histopathological changes were observed in the kidney and liver. Incidence and severity of renal lesions were significantly different from control animals at all U exposure concentrations. A LOAEL of 0.06 and 0.09 mg/kgBW/day for male and female rats, respectively, (units reported by authors) and estimated NOAEL of 0.006 and 0.009 mg/kgBW/day were identified from this study. The biological significance of kidney lesions is not known; therefore, this study was not used to select a TRV for this risk assessment.

New Zealand white rabbits were given uranyl nitrate hexahydrate in drinking water for 91 days (Gilman *et al*. 1998b). Males were exposed at concentrations of 0, 0.96, 4.8, 24, 120 or 600 mg/L, while exposure concentrations for females were 0, 4.8, 24 or 600 mg/L. At the end of the study, animals were euthanized and hematological, biochemical and histopathological analyses were conducted. No significant differences in weight gain, food consumption, or water intake were observed for either sex at any exposure concentration. Significant dose-related histopathological changes were observed in the kidney and thyroid glands, and to a lesser extent in the liver. Incidence and severity of renal lesions were significantly different from control animals at all U exposure concentrations. A LOAEL of 0.05 mg/kgBW/day (units reported by authors) and an estimated NOAEL of 0.005 mg/kgBW/day were identified from this study. The biological significance of kidney lesions is not known; therefore, this study was not used to select a TRV for this risk assessment.

Sprague-Dawley rats were exposed to uranyl acetate dihydrate in drinking water at concentrations of 0, 2, 4, 8 and 16 mg/kgBW/day for 4 weeks (Ortega *et al.* 1989). No significant differences in weight gain, food or water consumption were observed at any exposure concentration. Histopathological lesions in kidneys, liver and spleen were observed in rats exposed at a concentration of 16 mg/kgBW/day. A LOAEL of 16 mg/kgBW/day and a NOAEL of 8 mg/kgBW/day were identified from this experiment. The biological significance of kidney lesions is not known; therefore, this study was not used to select a TRV for this risk assessment.

Reproductive toxicity of uranyl acetate to male Swiss mice was evaluated by (Llobet *et al.* 1991). Mice were exposed to U in drinking water at concentrations of 0, 10, 20, 40 or 80 mg/kgBW/day for 64 days. At the end of the treatment period, each mouse was mated with two untreated females for four days. There was a significant decrease in pregnancy rate for all females mated to U exposed mice. Number of implantations, resorptions and dead fetuses did not differ in females that became pregnant. Adult body weights were significantly lower than controls for the 80 mg/kgBW/day exposure group. Testicular function and spermatogenesis were not significantly different from controls for any exposure group. Based on the decreased pregnancy rate, a LOAEL of 10 mg/kgBW/day and an estimated NOAEL of 1.0 mg/kgBW/day were identified from this experiment.

Swiss mice were administered uranyl acetate dihydrate at concentrations of 0, 5, 10, and 25 mg/kgBW/day (Paternian *et al.* 1989). Male mice were exposed for 60 days prior to mating, and female mice were exposed for 14 days prior to mating. Treatment of the females continued throughout mating, gestation, and nursing of the litters. Oral doses were given intragastrically. No adverse effects on fertility were observed at any exposure concentration. Numbers of late resorptions and dead fetuses were significantly increased for the 25 mg/kg/day exposure group. There was a significant increase in the number of dead young per litter for both the 10 and 25 mg/kg/day exposure groups. Growth of the offspring was significantly lower in all U-treated groups, and a significant dose-response relationship was observed. Based on the reduced growth, a LOAEL of 5 mg/kgBW/day and an estimated NOAEL of 0.5 mg/kgBW/day were identified.

To evaluate developmental toxicity of U, pregnant Swiss mice were given by gavage daily doses of 0, 5, 10, 25 and 50 mg/kgBW/day of uranyl acetate dihydrate on gestational days 6 to 15 (Domingo *et al.* 1989). Maternal toxicity was observed. Maternal weight gain was significantly lower in the 10, 25 and 50 mg/kg exposure groups, and food consumption was significantly lower in all U-exposed mice. Relative liver weights were significantly higher in all exposed females. There were no treatment-related effects on number of implantations, incidence of post-implantation loss, number of live fetuses per litter, or fetal sex ratio. Body weights of live fetuses were significantly reduced in all U-treated groups, and a significant dose-response relationship was observed. Uranium treatment resulted in a significantly increased incidence of external malformations (cleft palate, short or curled tails, hematoma) at all exposure concentrations. An increased incidence of poorly ossified or unossified skeletal elements was observed in mouse fetuses at exposure concentrations of 25 and 50 mg/kgBW/day. Based on the reduced fetal weight and increased incidence of external malformations, a LOAEL of 5 mg/kgBW/day and a estimated NOAEL of 0.5 mg/kgBW/day were identified from this experiment, and will be used to evaluated risk to mammals from exposure to U.

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Gilman, A., A. Gilman, D. C. Villeneuve, V. E. Secours, A. P. Yagaminas, B. L. Tracey, J. M. Quinn, V. E. Valli, R. J. Willes and M. A. Moss (1998a). "Uranyl nitrate: 28-day and 91-day toxicity studies in the Sprague-Dawley rat." Toxicol. Sci. **41**(1): 117-128.

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J.22 Vanadium

J.22.1 Toxicity to Birds

Mallard ducks were exposed to vanadium (V) (as vanadyl sulfate) at dietary concentrations of 2.84, 10.36 or 110 mg/kg for 12 weeks (White and Dieter 1978). No effects on body weight, blood chemistry or mortality were observed at any exposure concentration. An ingestion rate of 0.121 kg/day and body weight of 1.17 kg (reported by authors) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 11.4 mg/kgBW/day and an estimated LOAEL of 114 mg/kgBW/day will be used to evaluate risk from exposure to V for avian receptors.

White, D.H. and M. P. Dieter. 1978. Effects of dietary vanadium in mallard ducks. J. Toxicol. Environ. Health. 4:43-50.

J.22.2 Toxicity to Mammals

Male Swiss Webster mice were exposed to V in drinking water at concentrations of 0, 20, 40, 60 and 80 mg/kgBW/day for 64 days (Llobet et al. 1993). Males were mated with untreated females for four days. A significant decrease in the pregnancy rate was observed in females mated to males which received 60 or 80 mg/kgBW/day. Sperm count was significantly reduced in males exposed to V at concentrations of 40, 60 or 80 mg/kgBW/day, but sperm motility and testes weight were not affected. However, since fertility was not affected in the 40 mg/kg group, a LOAEL of 60 mg/kgBW/day was selected by the authors.

Rats were exposed to V via oral intubation at concentrations of 2.1, 4.2 and 8.4 mg/kgBW/day for 60 days prior to gestation through lactation (Domingo et al. 1986). Significant differences in reproductive parameters (number of dead young/litter, size and weight of offspring) were observed at all dose levels. Based on the ecological significance of the observed effects (reproduction) and because the LOAEL is the lowest cited adverse effect level for birds, a LOAEL of 2.1 mg/kgBW/day and an estimated NOAEL of 0.21 mg/kgBW/day will be used to evaluate risk from exposure to V for mammals.

Domingo, J.L., J.L. Paternain, J.M. Llobet and J. Corbella. 1986. Effects of vanadium on reproduction, gestation, parturition and lactation in rats upon oral administration. Life. Sci. 39:819-824.

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J.23 Zinc

J.23.1 Toxicity to Birds

White leghorn hens were fed diets containing Zn (as zinc oxide) at concentrations of 0 or 20,000 mg/kg for five days (Palafox and Ho-A 1980). All birds were fed the basal diet from 5 days to 12 weeks. Fertility and hatchability of eggs laid by Zn-treated hens collected 14 to 28 days after the 5-day feeding period were significantly decreased compared to those laid by control birds. Egg production and body weight of Zn-treated birds were also significantly depressed from 0 to 4 weeks. An ingestion rate of 0.103 kg/day and body weight of 1.45 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 1,420 and an estimated NOAEL of 142 mg/kgBW/day were calculated based on the results of this experiment.

Stahl et al. (1990) exposed white leghorn hens to a basal diet (28 mg/kg Zn) supplemented with 20, 200 or 2,000 mg/kg Zn as zinc sulfate for 44 weeks. No significant effects on fertility, hatchability, progeny growth to 3 weeks of age or Zn-related feather fraying were observed at any exposure concentration. An ingestion rate of 0.109 kg/day and body weight of 1.912 kg (cited by authors for the 2028 mg/kg dose group) were used to convert the exposure concentrations to units of mg/kgBW/day. A NOAEL of 114 mg/kgBW/day and an estimated LOAEL of 1,114 mg/kgBW/day were calculated based on the results of this experiment.

Mallard ducks were fed diets containing supplemental Zn (as zinc carbonate) at concentrations of 0, 3,000, 6,000, 9,000 or 12,000 mg/kg for 60 days (Gasaway and Buss 1972). The Zn concentration of the basal diet, a pelleted chicken developer-turkey finisher, was 250 mg/kg. To convert the exposure concentrations to a wet weight basis, a 7.5 percent moisture content cited for a chick developer diet (Street 1978) was used, resulting in exposure concentrations of 231 (control), 3,006, 5,550, 8,556 and 11,331 mg/kg. Food consumption of treated birds decreased immediately after being placed on the Zn-treated pellets; food consumption was inversely related to the concentration of Zn in the diet. In all birds fed Zn-supplemented diets, leg paralysis, diarrhea and weight loss were observed within 10 days. The gonads of Zn-treated birds were so reduced in size reproductive function may have been lost. Two of six birds fed Zn at a concentration of 3,000 mg/kg survived to the end of the experiment; all other experimental birds died. An ingestion rate of 0.139 kg/day and body weight of 1.25 kg (Piccirillo and Quesenberry 1980) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 938 mg/kgBW/day and an estimated NOAEL of 93.8 mg/kgBW/day were calculated based on the results of this experiment.

Three-day old mallard ducklings were fed diets containing Zn (as zinc sulfate) at concentrations of 0 or 2,500 mg/kg for 56 days (Kazacos and Van Vleet 1989). An additional control group was fed measured amounts of basal diet based on the lowest average daily food intake of ducklings in the Zn group. Ducklings were removed from the experimental groups and pancreatic tissue was examined to evaluate Zn-related pancreatic alterations over time. Ultrastructural features of the pancreas from the inanition control group were similar to those of the control group. Pancreatic atrophy due to decreased number and size of acinar cells was observed in Zn-treated ducklings. An ingestion rate of 0.0748 kg/day and body weight of 0.572 kg (Sugden et al. 1981; value cited for 4-week old ducklings) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 327 mg/kgBW/day and an estimated NOAEL of 32.7 mg/kgBW/day were calculated based on the results of this experiment.

The effects of dietary Zn on pancreatic function were evaluated in day-old chicks (Lu and Combs 1988). Chicks were fed a purified basal diet supplemented with 0, 500 or 1,000 mg/kg Zn (as zinc oxide) for nine days. Actual measured Zn concentrations in the diet were 87, 630 and 1,060 mg/kg. The purified diet was Se-deficient (0.01 mg/kg); Se is important in maintenance of pancreatic exocrine function in the chick. Growth rate, food intake and food utilization efficiency were significantly decreased in chicks fed Zn at a concentration of 1,000 mg/kg. Activities of pancreatic exportable enzymes were decreased, and these reductions were associated with reductions in digestibility of dietary starch. Similar effects were not observed in chicks fed a nonpurified diet supplemented with 2,000 mg/kg for 20 days. The experiments demonstrated that the pancreas is a target organ of Zn toxicity in the chick, and that dietary factors that increase the bioavailability of Zn affect the concentration at which toxic effects are observed. Food ingestion rates of

5.5 and 5.9 g/day and body weights of 46.7 and 48.5 g (cited by authors for 1,060 and 630 mg/kg exposure groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 125 mg/kgBW/day and a NOAEL of 77 mg/kgBW/day were calculated based on the results of this experiment. This experiment was not used to derive TRVs for this risk assessment, because adverse growth effects were only observed when chicks were fed Se-deficient diets.

Fourteen-day old female broiler chicks were fed diets containing supplemental Zn (as zinc oxide) at concentrations of 0, 2,000, 4,000 or 6,000 mg/kg for 42 days (Dewar et al 1982). The basal diet contained 101 mg/kg Zn. Mortality was high in chicks fed the high Zn diet. Growth was significantly depressed in all chicks fed the Zn supplemented diets, and gizzard erosion and pancreatic lesions were observed in many chicks upon histopathological examination. Due to excessive food spillage, food consumption could not be measured accurately in this experiment. In a second experiment, 1-day old chicks were fed diets containing 0, 1,000, 2,000 or 4,000 mg/kg supplemental Zn for 28 days. High mortality was observed in the 4,000 mg/kg group, and growth was significantly decreased in the chicks fed Zn at concentrations of 2,000 or 4,000 mg/kg. Pancreatic lesions were found in all chicks fed Zn supplemented diets during this experiment, and gizzard erosion was observed in the two higher concentration groups. Based on adverse effects on growth, a LOAEL of 2,000 mg/kg and a NOAEL of 1,000 mg/kg supplemental Zn were identified. Ingestion rates of 0.04 and 0.044 kg/day and body weights of 0.308 and 0.335 kg (cited by authors for the 2,000 and 1,000 mg/kg experimental groups, respectively) were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 273 mg/kgBW/day and a NOAEL of 145 mg/kgBW/day were calculated based on the results of this experiment.

One-day old chicks (New Hampshire X Single Comb White Leghorn) were fed diets containing Zn at concentrations of 37 (control), 103, or 2,183 mg/kg for 21 days (Stahl et al 1989). A significant decrease in growth was observed in chicks exposed to dietary Zn at a concentration of 2,183 mg/kg for 21 days; no effect on growth was observed at 103 mg/kg. In addition to growth, excretion, immune response, and Fe and Cu utilization were measured. Chicks fed the two experimental diets excreted more Zn than control birds. Tissue concentrations of Zn were similar to control birds in the 103 mg/kg exposure group, while the highest exposure group accumulated Zn in their tissues. Immune responses were not affected by Zn exposure. Iron and Cu utilization were affected in birds fed the highest Zn diet; however, effects were also seen in pair-fed birds and may have been due to reduced food intake or growth. The average food ingestion rates and body weights cited in U.S. EPA 1988 for 7, 14, and 21-day old chicks (0.0075, 0.0126 and 0.019 kg/day and 0.066, 0.121 and 0.193 kg) were used to convert the concentration at which decreased growth was observed to units of mg/kgBW/day (0.013 kg/day and 0.127 kg). A LOAEL of 223.5 and a NOAEL of 10.5 were calculated. Based on the ecological significance of the endpoint (growth) and because the LOAEL is the lowest cited adverse effect level for birds, the TRV values from this study will be used to evaluate the risk posed by Zn to avian receptors.

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Gasaway, W.C. and I.O. Buss. 1972. Zinc toxicity in the mallard duck. J. Wildl. Manage. 36(4):1107-1117.

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Street, M. 1978. The role of insects in the diet of mallard ducklings–an experimental approach. Wildfowl. 29:93-100.

Sugden, L.G., E.A. Driver and M.C.S. Kingsley. 1981. Growth and energy consumption by captive mallards. Can. J. Zool. 59:1567-1570.

U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87-008.

J.23.2 Toxicity to Mammals

Mice fed a diet containing 600 mg/kg BW/day Zn suffered from anemia (Walters and Roe 1965). Mice exposed to 317 mg/kg BW/day Zn had reduced plasma Cu, lowered hematocrit, reduced body weight, and hair loss (Mulhern et al. 1986). Long-Evans rats exposed to a diet containing 300 mg/kg BW/day Zn showed reduced growth rate, anemia, reduction in hemoglobin and red blood cell volume, and Cu deficiency (Cox and Harris 1960). Dogs exposed for a period of one year to 25 mg/kg BW/day Zn showed no adverse effects (NAS 1979).

European ferrets were fed diets containing Zn at concentrations of 500, 1,500 and 3,000 mg/kg; the control diet contained 27 mg/kg Zn (Straube et al. 1980). The groups fed the two highest concentrations showed severe signs of toxicity after one to two weeks of exposure, and 100 % mortality was observed in the 3,000 mg/kg group in less than two weeks. Ferrets fed a diet containing 1500 mg/kg Zn lost 40 to 50 % of their body weight, and the animals had soft, enlarged kidneys. A diffuse nephrosis and glomerular damage were observed upon histopathologic examination. No significant adverse effects were observed in the 500 mg/kg group. A food ingestion rate of 0.17 kg/day and body weight of 0.6 kg were used to convert the exposure concentrations to units of mg/kgBW/day. A LOAEL of 425 mg/kgBW/day and a NOAEL of 142 mg/kgBW/day were calculated based on the results of this experiment.

Schlicker and Cox (1968) exposed Sprague-Dawley rats for 37 days during mating and gestation period to two dietary dose levels of zinc oxide (2,000 and 4,000 mg/kg); a control group was included in the experimental design. No adverse effects were observed at an exposure concentration of 2,000 mg/kg. Increased rates of fetal resorption and reduced fetal growth rates were observed in rats exposed to Zn at a concentration of 4,000 mg/kg. An ingestion rate of 0.034 kg/day and adult body weight of 0.48 kg (U.S. EPA 1988) were used to convert the exposure concentration to units of mg/kgBW/day, resulting in a LOAEL of 283 mg/kg BW/day and a NOAEL of 142 mg/kg BW/day.

Adult mink were exposed to a diet supplemented with 1,000 mg/kg Zn (as $ZnSO_4 \cdot 7H_20$) for 22 weeks; the control diet contained 20.2 mg/kg Zn (Bleavins et al. 1983). Kits were maintained on the same diet as their parents for 12 weeks following their birth. Gestation length, litter size, kit birth weight and kit mortality to weaning were not significantly different between the Zn-treated and control groups. Reduced growth rate, alopecia, achromatrichia and profound immunosuppression were observed in the offspring produced by the Zn-treated females. Based on the reduced growth observed in offspring, an exposure concentration of 1,020.2 mg/kg was selected as the LOAEL. An ingestion rate of 0.249 kg/day (U.S. EPA 1993) and a body weight of 1.13 kg (Merritt 1987) was used to convert the exposure concentration to units of mg/kgBW/day. A LOAEL of 225 mg/kg BW/day and an estimated NOAEL of 22.5 mg/kg BW/day were calculated. Based on the ecological significance of the endpoint (reproduction) and because the LOAEL is the lowest cited adverse effect level for mammals, the TRV values from this study will be used to evaluate the risk posed by Zn to mammalian receptors.

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U.S. EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. EPA/600/6-87/008.

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Appendix K - Toxicity Profiles for Amphibians
Midnite Mine Site
Final Report

K.1 Aluminum

The effects of exposure to aluminum (Al) on the Iberian ribbed newt (*Pleurodeles waltl*) were evaluated by Calevro *et al*. 1999. Fertilized eggs were exposed to Al concentrations of 0, 0.0015, 0.015, 0.15, 0.75, and 1.5 millimoles per liter (mmol/L) from the early blastula stage until the early larval stages (168 hours post-fertilization). Test solutions were renewed at 24-hour intervals during the exposure period. Metal ion concentrations were measured at least three times during the exposure period; observed Al concentrations were 96 percent (%) of the nominal values. Aluminum at a concentration of 0.15 mmol/L caused malformation in 40% of treated embryos, and 10% died by the end of the experiment. Exposure to Al at a concentration of 0.75 mmol/L resulted in malformations in 80% of treated embryos, and 40% mortality. At the highest exposure concentrations, 100% mortality was observed within a short time of exposure. Based on the observed embryo malformations and mortality observed at an exposure concentration of 0.15 mmol/L, this concentration was selected as the lowest observed adverse effect level (LOAEL). The molecular weight of Al is 26.98 daltons; this was used to convert the exposure concentration to units of milligrams per liter (mg/L). A LOAEL of 4.05 mg/L and a no observed adverse effect level (NOAEL) of 0.405 mg/L were identified from this experiment.

Calevro, F., S. Campani, C. Filippi, R. Batistoni, P. Deri, S. Bucci, M. Ragghianti and G. Mancino 1999. "Bioassays for testing effects of Al, Cr and Cd using development in the amphibian *Pleurodeles waltl* and regeneration in the planarian *Dugesia etrusca*." Aquatic Ecosystem Health and Management **2**: 281-288.

K.2 Cadmium

K.2.1 Exposure to Cadmium in Water

Toxicity of cadmium (Cd) (as cadmium chloride) to pre-treated and naive African clawed frog tadpoles (*Xenopus laevis*) was determined in recirculated water systems (Woodall *et al*. 1988). Pre-treated animals were exposed to sub-lethal doses of cadmium chloride at a concentration of 2.5 mg/L for 96 hours. Pre-treated and naive tadpoles were exposed to cadmium chloride at concentrations of 0, 50, 80 or 100 mg/L for 90 hours. Percent mortality of pre-treated tadpoles exposed at concentrations of 0, 50, 80 or 100 mg/L for 90 hours was 0, 0, 30 and 35%. Percent mortality of naive tadpoles exposed at concentrations of 0, 50, 80 or 100 mg/L for 90 hours was 0, 80, 100 and 100%. Prior exposure to sublethal concentrations of Cd protected tadpoles exposed to higher concentrations later, probably due to induction of metallothionein synthesis. Based on the mortality observed in naive tadpoles, a LOAEL of 5 mg/L (exposure concentration at which greater than 50% mortality was observed converted to a LOAEL using a factor of 10) and an estimated NOAEL of 0.5 mg/L were identified based on results of this experiment.

Short and long-term toxicity of Cd (as cadmium chloride) to African clawed frogs was evaluated by Canton and Sloof (1982). Forty-eight hour lethal concentration, 50 % (LC_{50}) and no observed effect concentration (NOEC) values of 3.2 mg/L and 2.2 mg/L were calculated. In the long-term experiment, two-day old larvae were exposed to Cd in static renewal tests for 100 days. Based on mortality, LC_{50} and NOEC values of 1.5 mg/L and

0.03 mg/L were calculated. When the measured endpoint was inhibition of larval development, effect concentration, 50 % (EC_{50}) and NOEC values of 650 micrograms per liter (µg/L) and 9 µg/L, respectively, were calculated. Based on the larval development inhibition, a LOAEL of 650 µg/L and a NOAEL of 9 µg/L were identified from this experiment.

American toad tadpoles (*Bufo americanus*) were exposed to Cd in water at concentrations of less than (<)1 (control), 5, 54 or 540 µg/L from shortly after hatching through metamorphosis (James and Little 2003). Percent survival, percent metamorphosis, weight at metamorphosis, and days to tail resorption were measured. Percent survival and percent metamorphosis were significantly less for tadpoles exposed at a concentration of 540 µg/L compared to control tadpoles. A LOAEL of 540 µg/L and a NOAEL of 54 µg/L were identified from this experiment.

Salamanders (*Notophthalmus viridescens*) were exposed to Cd in water at nominal concentrations of 0, 2.25, 4.5, or 6.75 mg/L for 80 days (Manson and O'Flaherty 1978). Mortality was observed in all Cd-exposed groups. Survival rates of 65, 55 and 20% were observed in the 2.25, 4.5 and 6.75 mg/L groups by day 51 of the experiment. Because Cd-exposed newts refused food at least part of the time, some of the observed mortality could have been due to weight loss rather than direct Cd toxicity. A delay in rate and quality of regeneration was observed at all exposure concentrations; however, regeneration in all groups was similar by day 76. Death rates and regeneration indices were similar in the groups exposed at concentrations of 2.25 and 4.5 mg/L. In addition to higher mortality and a longer delay in the onset of regeneration, salamanders exposed at a concentration of 6.75 mg/L were uncoordinated and showed sporadic paralysis. A second experiment was conducted to further evaluate the quality of regeneration without the high mortality observed in the first experiment. Salamanders were exposed to Cd concentrations of 0, 2, 2.5, 3, 3.5, 4 and 4.5 mg/L for the duration of the regeneration period. On Day 25, percent survival in each group was as follows: control, 100%; 2.0 mg/L, 70%; 2.5 mg/L, 83%; 3.0 mg/L, 67%; 3.5 mg/L, 60%; 4.0 mg/L, 54%; and 4.5 mg/L, 40%. The incidence of minor abnormalities increased with Cd exposure levels, with more severe abnormalities observed at exposure concentrations of 3.5 mg/L and greater. However, a high incidence of severe abnormalities was also observed in the control group (20% with no regeneration), making it difficult to identify a LOAEL based on quality of limb regeneration. Mortality observed at a concentration of 4.5 mg/L was 45% in the first experiment and 60% in the second experiment. A LOAEL of 0.45 mg/L (concentration where 50% of the test animals died converted to a LOAEL using a conversion factor of 10) and a NOAEL of 0.045 mg/L were estimated based on the results of this experiment.

The effects of exposure to Cd on the Iberian ribbed newt were evaluated by Calevro *et al.* (1999). Fertilized eggs were exposed to Cd concentrations of 0, 0.18, 1.8, 10, 18 and 50 micromoles per liter (µmol/L) from the early blastula stage until the early larval stages (168 hours post-fertilization). Test solutions were renewed at 24-hour intervals during the exposure period. Metal ion concentrations were measured at least three times during the exposure period; observed Cd concentrations were 99.9% of the nominal values. Mortality and embryo malformations (flexures of the skeletal system, occurrence of oedemas, aberrant formation of the nervous and optical systems, and delay of development) were measured daily. Calculated LC_{50} and EC_{50} values for Cd were 8 and 3.8 µmol/L, respectively. Following Cd exposure, deformed embryos showed a significant delay in development of the head and cephalic structures. The LOAEL was based on the EC_{50} value (concentration at which embryo malformations were observed in 50% of exposed embryos). The molecular weight of Cd is 112.4 daltons; this was used to convert the exposure concentration to units of mg/L. A LOAEL of 427 µg/L and an estimated NOAEL of 42.7 µg/L were identified from this experiment.

Young tadpoles (characterized by incipient development of hind limbs) and prometamorphic tadpoles (distinguished by presence of five digits on hind limbs) were exposed to Cd at concentrations of 0, 1, 2, 4, 8, and 16 mg/L in 96-hour static, renewal bioassays to determine LC_{50} concentrations (Ferrari *et al.* 1993). Tests were conducted at two temperatures, 20 and 25 degrees centigrade (°C). The LC_{50} values calculated for young tadpoles were 2.19 and 2.65 mg/L at 20 and 25°C, respectively. The LC_{50} values calculated for prometamorphic tadpoles were 3.06 and 6.77 mg/L at 20 and 25°C, respectively. The 96-hour LC_{50} measured for young tadpoles at 20°C was identified as the lowest effect level from this experiment. A LOAEL of 0.219 mg/L (LC_{50} converted to a LOAEL using a conversion factor of 10) and an estimated NOAEL of 0.0219 mg/L were calculated based on the results of this experiment.

Nebeker *et al.* (1995) evaluated the effects of Cd on survival, growth and bioaccumulation in larvae and metamorphosed juveniles of the Northwestern salamander *(Ambystoma gracile)*. Two experiments were conducted to evaluate larval growth following exposure to Cd in water in continuous-flow systems. A 96-hour LC_{50} value of 468.4 µg/L was determined for three-month old larvae. In a 10-day exposure, significant adverse effects on growth were observed at a measured Cd concentration of 227.3 µg/L; no effects on growth were observed at a concentration of 106.3 µg/L. In a 24-day exposure, significant adverse effects on growth were observed at a measured Cd concentration of 193.1 µg/L; no effects on growth were observed at a concentration of 48.9 µg/L. Cadmium tissue bioconcentration factors (BCFs) ranging from 7.72 to 61.72 were observed in the 10-day test. Bioconcentration factors ranging from 24.34 to 63.16 were observed in the 24-day test. Based on the reduced growth observed in the 24-day experiment, a LOAEL of 193.1 µg/L and a NOAEL of 48.9 µg/L were identified from this experiment.

The effects of Cd on limb regeneration in larvae of the Northwestern salamander were evaluated by Nebeker *et al.* (1994). In the first experiment, salamanders were exposed to mean measured Cd concentrations of < 2, 12.8, 44.6, 106.3, 227.3, and 535.1 µg/L for 10 days. There was a significant adverse effect on limb regrowth at a concentration of 44.6 µg/L, and no effect on limb regrowth was observed at a concentration of 12.8 µg/L. In a second experiment, animals were exposed to mean measured Cd concentrations of < 2, 15.2, 48.9, 193.1, and 504.5 µg/L for 24 days. There was a significant adverse effect on limb regrowth at a concentration of 193.1 µg/L, and no effect on limb regrowth was observed at a concentration of 48.9 µg/L. Based on the reduced limb regrowth observed in the 24-day experiment and the longer duration of the experimental period, a LOAEL of 193.1 µg/L and a NOAEL of 48.9 µg/L were identified from this experiment.

Toad (*Bufo arenarum*) embryos were exposed to Cd at concentrations ranging from 0.1 to 4 mg/L (Herkovits and Coll 1993). The study evaluated the minimal Cd concentration causing the embryos at six different stages (2 blastomere, late gastrulae, neural tube, gill circulation, opercular folds, and complete operculum) to arrest their development and die within 24 hours. Survival of control embryos was over 90%. Survival of Cd-treated embryos was significantly stage-dependant, with the neural tube stage 16 times more sensitive than the blastulae. An exposure concentration of 0.25 mg/L Cd arrested the development of 100% of the embryos at the neural tube stage within 24 hours. At the post-neural stages, the embryos gradually became more resistant. A LOAEL of 0.025 mg/L (LC_{50} converted to an LOAEL using a conversion factor of 10) and an estimated NOAEL of 0.0025 mg/L were identified from this experiment.

Lefcort *et al.* (1998) evaluated the effects of Cd on the survival, growth, metamorphosis, and behavior of Columbian spotted frog (*Rana luteiventris*) tadpoles. In the first experiment, tadpoles were exposed to Cd at concentrations of 0, 10, 20, and 50 mg/L to determine a 96-hour LC_{50} value. A 96-hour LC_{50} of 15.81 mg/L was calculated. In a second experiment, survival, growth and metamorphosis of tadpoles in a mini-ecosystem (containers with sand substrate, dechlorinated tap water, and a measured innoculum of leaf litter, algae and zooplankton) were measured. Exposure concentrations were 0, 0.1, 5 and 20 mg/L Cd (as cadmium nitrate tetrahydrate). All animals in the medium and high Cd treatments died by the second week of the experiment; percent survival in the low Cd treatment was 25%. There was no difference in length, weight or time to metamorphosis between low Cd and control tadpoles. A third experiment evaluated behavioral response of tadpoles exposed to water that had been in contact with predacious rainbow trout. Due to the high mortality of medium and high Cd tadpoles in the second experiment, these groups were not tested. There was no interaction between predator presence and behavior of the low Cd tadpoles. Based on the low survival of tadpoles in the second experiment, a LOAEL of 0.01 mg/L Cd (exposure concentration where greater than 50% mortality was observed adjusted to a LOAEL using a conversion factor of 10) and an estimated NOAEL of 0.001 mg/L Cd were identified from this experiment. These values will be used as the toxicity reference values (TRVs) for exposure of amphibians to Cd in water.

K.2.2 Exposure to Cadmium in Food

Feeding tests were conducted to evaluate effects of dietary Cd on growth and survival of larval and juvenile Northwestern salamanders (Nebeker *et al.* 1995). Three-month old larval salamanders were hand-fed Cd-spiked food pellets containing measured Cd concentrations of 0, 26, 33, 88, 146, 305, 548 or 1,173 micrograms per gram (µg/g) for 7 days. No effects on growth or survival were observed at any exposure concentration. Larvae fed Cd-spiked food for 7 days had similar low bioaccumulation factors (BAFs) values (tissue Cd concentration wet weight/food Cd concentration wet weight ranging from 0.02 to 0.06), in contrast to water exposures where the BCFs decreased with increasing exposure concentrations. In a second experiment, 18-month old juvenile salamanders were hand-fed food pellets containing Cd at measured concentrations of 0, 982, 2,458, or 5,701 µg/g for 7 days. No effects on growth or survival were observed at any exposure concentration. Salamanders fed at the two highest exposure concentrations, regurgitated over half the food fed during the experiment. Tissue Cd concentrations increased with increasing food concentration, but BAF values were all less than 1.0 (range 0.02 to 0.1). Because no growth effects were observed at any exposure concentration, a NOAEL of 1,173 µg/g was identified from this experiment (highest concentration tested in the larval experiment; the two highest concentrations from the juvenile experiment were not used due to the high incidence of regurgitation). It should be noted sample sizes (n) were low (n = 4 and n = 3 per exposure concentration for the larval and juvenile experiments, respectively) and that experiment duration was short (7 days) for this experiment. A NOAEL of 1,173 µg/g and an estimated LOAEL of 11,730 µg/g will be used to evaluate risk to amphibians from exposure to Cd in food.

K.2.3 Exposure to Cadmium in Sediment

Toxicity tests were conducted to evaluate the effects of exposure to Cd-enriched sediment on embryo-larval stages of the Northern leopard frog (*Rana pipiens*) (Francis *et al*. 1984). Natural stream sediment was collected, enriched with Cd at nominal concentrations of 0, 1.0, 10, 100 and 1,000 mg/kg (measured concentrations of 1.04, 2.28, 11.48, 96.8 and 1,074 mg/kg), and covered with reconstituted water. Fertilized eggs were placed in the dishes and maintained through four days post hatching. Survival was 99% or higher for frog embryo-larval stages at all exposure concentrations. Tissue Cd concentrations increased with increased sediment Cd concentrations (0.08, 0.34, 3.08 and 12.55 µg/g at sediment concentrations of 1, 10, 100 or 1,000, respectively). It should be noted that *Xenopus* eggs remained in the water column above the sediment for much of the experiment; direct contact with contaminated sediment was limited. Based on the high survival, a NOAEL of 1,074 mg/kg and an estimated LOAEL of 10,740 mg/kg were identified from this experiment.

Effects of Cd in sediment on hatchability and development of narrow-mouthed toad (*Gastrophryne carolinensis*) eggs was evaluated by Birge *et al*. (1977). Cadmium was added to natural stream sediment at nominal concentrations of 0, 0.1, 1.0, 10.0 and 100 mg/kg; measured concentrations were 1.00, 1.34, 2.18, 14.8 and 122.8 mg/kg. Exposure was initiated at fertilization and was continuous through four to 10 days post-hatching; hatching occurred on developmental day three. Frequencies of mortality and teratogenesis were control adjusted, with values calculated as frequency of response in metal-spiked sediment divided by frequency of response in control sediment. At hatch, mortality was 27, 26, 31 and 36% at exposure concentrations of 1.34, 2.18, 14.8 and 122.8 mg/kg, respectively. Teratogenesis was determined to be 1, 9, 7 and 11 % at the above exposure concentrations. Mortality was measured again at four days post-hatch, and was 33, 33, 41 and 52% at exposure concentrations of 1.34, 2.18, 14.8 and 122.8 mg/kg, respectively. Because embryonic stages suffered higher mortality rates than post-hatch larvae, the authors concluded that sediment metals were more lethal to eggs than to free-living larvae. Based on the increased mortality observed at a sediment concentration of 1.34 mg/kg, this value was identified as the LOAEL. A LOAEL of 1.34 mg/kg and an estimated NOAEL of 0.134 mg/kg will be used to evaluate risk to amphibians from exposure to Cd in sediment.

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Nebeker, A. V., G. S. Schuytema and S. L. Ott 1994. "Effects of cadmium on limb regeneration in the Northwestern salamander *Ambystoma gracile*." Arch Environ. Contam. Toxicol. **27**: 318-322.

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K.3 Chromium

The effects of exposure to chromium (Cr) on the Iberian ribbed newt were evaluated by (Calevro *et al.* 1999). Fertilized eggs were exposed to Cr^{+3} at concentrations of 0, 0.0015, 0.015, 0.15, 0.75, and 1.5 mmol/L from the early blastula stage until the early larval stages (168 hours post-fertilization). Test solutions were renewed at 24-hour intervals during the exposure period. Metal ion concentrations were measured at least three times during the exposure period; observed Cr concentrations were 97% of the nominal values. No mortality or embryo malformations were observed at exposure concentrations of 0.0015, 0.015, or 0.15 mmol/L. Chromium at a concentration of 0.75 mmol/L caused malformation in 50% of treated embryos, and 10% died by the end of the experiment. At the highest exposure concentrations, 100% mortality was observed after 168 hours. Based on the observed embryo malformations and mortality observed at an exposure concentration of 0.75 mmol/L, this concentration was selected as the LOAEL. The molecular weight of Cr is 51.996 daltons; this was used to convert the exposure concentration to units of mg/L. A LOAEL of 38.9 mg/L and a NOAEL of 7.8 mg/L were identified from this experiment.

The influence of temperature, pH, and hardness on the toxicity of chromium trioxide to female Indian skipper frogs (*Rana cyanophlyctis*) was evaluated using static renewal bioassays (Joshi and Patil 1992). Increased toxicity was associated with high temperature, low pH and low hardness. Temperature affected toxicity least; 96-hour LC_{50} values were 115, 105 and 80 mg/L at temperatures of 15, 28 and 35ºC, respectively. Ninety-six hour LC_{50} values were 33, 87 and 115 mg/L at pH values of 4.0, 7.0 and 10.0. The ionic species of hexavalent chromium (Cr^{+6}) present is affected by pH; chromium is present mainly as chromate in neutral and basic water, and as dichromate in acidic water. The 96-hour LC_{50} values calculated under different hardness conditions (10, 100 or 300 mg calcium carbonate) were 53, 105 and 155 mg/L, respectively. The LC_{50} value of 33 mg/L observed at a pH of 4 was identified as the lowest effect concentration for this experiment. A LOAEL of 3.3 mg/L (LC_{50} value converted to a LOAEL using a conversion factor of 10) and an estimated NOAEL of 0.33 mg/L were calculated based on results of this experiment.

Calevro, F., S. Campani, C. Filippi, R. Batistoni, P. Deri, S. Bucci, M. Ragghianti and G. Mancino 1999. "Bioassays for testing effects of Al, Cr and Cd using development in the amphibian *Pleurodeles waltl* and regeneration in the planarian *Dugesia etrusca*." Aquatic Ecosystem Health and Management **2**: 281-288.

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K.4 Copper

Adult female lowland frogs (*Rana ridibunda*) were exposed to copper (Cu) (as copper chloride) at concentrations of 0, 50 or 100 mg/L for 30 days (Papadimitriou and Loumbourdis 2002). There were no statistically significant differences between groups in survival, body length, body weight, or liver weight. A biomarker of exposure to Cu indicative of oxidative damage of lipid in liver [malondialdehyde (MDA) concentration] increased as Cu exposure concentration increased; levels were significantly higher in frogs exposed at a concentration of 100 mg/L. Hepatic glutathione (GSH) (a cellular thiol capable of complexing heavy metal cations after entering the cell, reducing their toxicity) was also significantly higher in frogs exposed at a concentration of 100 mg/L. Because the biological significance of elevated levels of MDA and GSH is not known, this study was not used to develop a TRV for Cu.

The acute toxicity of Cu to tadpoles of the bullfrog *(Rana catesbeiana)* was evaluated using 96-hour static bioassays (Lombardi *et al*. 2002). Tadpoles were exposed to Cu at nominal concentrations of 0., 2.0, 4.0, 8.0, 16.0 or 32.0 mg/L. No mortality was observed in the control group. An LC_{50} value of 2.83 mg/L was calculated. Analysis of whole-body Cu concentration showed uptake of Cu directly proportional to exposure concentration. A LOAEL of 0.283 mg/L (LC_{50} value converted to a LOAEL using a factor of 10) and an estimated NOAEL of 0.0283 mg/L were calculated based on results of this experiment.

Northern leopard frog eggs and tadpoles were raised in water treated with copper sulfate ($CuSO_4 \cdot 5H_2O$) at concentrations of 0, 0.04, 0.05, 0.06, 0.16, 0.31, 0.62, or 1.56 mg/L Cu (Lande and Guttman 1973). Eggs were not affected by exposure to the Cu salt. One hundred percent mortality of tadpoles was observed at the three highest exposure concentrations. A 72-hour lethal dose, 50 percent (LD_{50}) value of 0.15 mg/L was calculated. Growth of tadpoles was significantly decreased at exposure concentrations of 0.06 and 0.16 mg/L. A LOAEL of 0.06 mg/L and a NOAEL of 0.05 mg/L were identified based on the results of this experiment.

The toxicity of Cu to the gray treefrog (*Hyla chrysocelis*) and the Northern leopard frog was evaluated by Gottschalk (1995). All experiments were conducted in synthetic soft water (mean hardness of 45 mg/L as $CaCO_3$). Tests were initiated when tadpoles were approximately 8 days old. For the gray treefrog, test exposure concentrations were 0, 0.0088, 0.0145, 0.0251, 0.038 and 0.0518 mg/L. The LC_{50} value calculated for tree frogs was 0.0245 mg/L. At exposure concentrations of 0.0251 mg/L and above, Cu induced abnormal behavior in 60% or more of the tree frogs (loss of equilibrium or thrashy, sporadic or struggled movement), and caused tail kinking in 90% or more of the tadpoles. For the Northern leopard frog, test exposure concentrations were 0, 0.04, 0.07, 0.09, 0.11, 0.13 and 0.15 mg/L. The LC_{50} values calculated for Northern leopard frogs in two definitive tests were 0.0795 and 0.0761 mg/L. In both experiments with Northern leopard frogs, Cu altered behavior at all exposure concentrations, inducing at least a 70% response at each exposure level. Exposure concentrations of 0.07 mg/L and higher caused tail kinking in 100% of the tadpoles. Although the behavioral responses observed following Cu exposure may increase the susceptibility of a tadpole to predation and be an ecologically significant endpoint, the calculated LC_{50} value for the tree frog was selected as the LOAEL. A LOAEL of 0.00245 mg/L (LC_{50} value converted to a LOAEL using a factor of 10) and an estimated NOAEL of 0.00025 mg/L were identified based on the results of this experiment.

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Impact on two biomarkers, lipid peroxidation, and glutathione." Bull. Environ. Contam. Toxicol. **69**: 885-891.

K.5 Lead

K.5.1 Exposure to Lead in Water

Lefcort *et al.* (1998) evaluated effects of lead (Pb) on the survival, growth, metamorphosis, and behavior of Columbia spotted frog tadpoles. In the first experiment, tadpoles were exposed to Pb at concentrations of 0, 1, 5, 20, 50 and 100 mg/L to determine a 96-hour LC_{50} value. Lead would not stay in solution; any chemicals added to keep Pb in solution were toxic when presented alone. Therefore, an LC_{50} value was not determined for Pb. In a second experiment, survival, growth and metamorphosis of tadpoles in a mini-ecosystem (containers with sand substrate, dechlorinated tap water, and a measured innoculum of leaf litter, algae and zooplankton) were measured. Exposure concentrations were 0, 0.01, 5 and 50 mg/L Pb (as lead nitrate). Again, most of the Pb did not stay in solution; after day 1, the aqueous Pb concentration fell to <0.1 mg/L in all containers. After 5 weeks, measured Pb concentrations were 0.003, 0.11, and 0.05 mg/L in water and 2.102, 7.942 and 8.763 mg/kg in tadpole for the low, medium and high Pb treatments, respectively. Percent survival in the medium and high Pb treatments was significantly less than for control and low Pb tadpoles. Tadpoles that underwent metamorphosis at an older age tended to be heavier; tadpoles from the medium and high Pb treatments weighed significantly more than low Pb and control tadpoles. A third experiment evaluated behavioral response of tadpoles exposed to water that had been in contact with predacious rainbow trout. Tadpoles exposed to medium Pb levels did not flee to plant refugia when exposed to the odor of a fish that had fed on tadpoles; control tadpoles fled to plants and reduced their activity levels. Although Pb exposure affected tadpole survival, time to metamorphosis, and behavior, an exposure concentration could not be identified because Pb did not remain in solution and substrate Pb was not measured. Therefore, results from this experiment were not used to derive a TRV for Pb.

Static acute toxicity tests were conducted to evaluate the toxicity of Pb to adult male and female Indian skipper frogs (Mudgall and Patil 1988). Pond water containing Pb [as $Pb(NO_3)_2$] was renewed every 24 hours. The 96-hour LC_{50} values calculated for male and female frogs were 1,540.7 and 1,622.3 mg/L, respectively. A LOAEL of 154 mg/L (LC_{50} value converted to a LOAEL using a factor of 10) and an estimated NOAEL of 15.4 mg/L were identified based on the results of this experiment.

Steele *et al.* (1991) evaluated the preference-avoidance responses of American toad tadpoles to Pb-enriched water. All tadpoles were at a comparable premetamorphic stage of development. Tadpoles were exposed to Pb at concentrations of 0, 500, 750 or 1,000 µg/L for 144 hours. No mortality was observed at any exposure concentration. No consistent preference or avoidance of any tested Pb concentration was observed. Based on the lack of mortality, a NOAEL of 1,000 µg/L and an estimated LOAEL of 10 mg/L were identified from this experiment.

Effects of Pb on larval *B. arenarum* survival were studied by Herkovits and Perez-Coll (1991). Fertilized eggs were kept in Holtfreter solution until the end of embryonic development, the completed operculum stage. At that point, larvae were exposed to Pb at concentrations of 0, 8 or 16 mg/L for 120 hours. Survival of larvae exposed to Pb at concentrations of 8 or 10 mg/L was significantly lower than control survival (60, 40, and 100% at 120 hours, respectively). Low motility, erratic swimming and loss of equilibrium was observed in Pb-exposed larvae. A LOAEL of 8 mg/L and an estimated NOAEL of 0.8 mg/L were identified from this experiment.

Effects of exposure to Pb on growth and time to metamorphosis on bullfrog larvae were evaluated by Rice *et al.* (2002). Larval frogs were exposed to 0 or 1,049 µg/L from the postembryonic stage to metamorphic climax. Control larvae were significantly longer and greater in mass after 10 weeks of exposure. There was no significant difference between control and Pb-exposed larvae in length or mass upon reaching stage 42 (forelimb emergence); however, control larvae reached stage 42 in significantly fewer days (104 versus 133). Total body Pb concentrations were significantly different for larvae exposed for 2, 8 or greater than 14 weeks. The proportion of Pb in the gut (> 90% of the body burden) was significantly higher in larvae exposed for 2 or 8 weeks than in those exposed for greater than 14 weeks. Lead was mainly in the carcass for larvae exposed for longer than 14 weeks. Total body Pb concentrations decreased from week 8 to week 14. Based on the slower growth and longer metamorphic duration, a LOAEL of 1,049 µg/L and an estimated NOAEL of 0.105 µg/L were identified from this experiment.

The effect of Pb on metamorphosis of Southern leopard frog (*Rana utricularia*) tadpoles was evaluated by Yeung (1978). Beginning premetamorphic stage larvae were exposed to Pb at concentrations of 0, 0.1, 0.5, 1.0 or 1.5 mg/L for 106 days. The sequence of developmental events and gross external and internal morphology were not affected by Pb exposure. Lead prolonged the duration of metamorphosis by delaying the completion of each successive prometamorphic stage. The length of time required to complete metamorphosis was significantly longer for tadpoles exposed to Pb at concentrations of 1.0 mg/L. A LOAEL of 1.0 mg/L and a NOAEL of 0.5 mg/L were identified based on the results of this experiment.

Bullfrog larvae were exposed to either 0 or 780 µg/L Pb and either 3.50 or 7.85 mg/L dissolved oxygen for seven days (Rice *et al.* 1999). Activity was significantly decreased in larvae exposed to low oxygen, Pb, or both. Higher buccal ventilation rates were observed in larvae exposed to either Pb or low oxygen. Lead-exposed larvae surfaced significantly more than unexposed larvae even under high oxygen conditions. Exposure to Pb may increase susceptibility to predation due to the increased presence of larvae at the surface. Lead-exposed larvae decreased in mass during the exposure period, while unexposed larvae increased in mass; oxygen concentration had no effect on mass. Based on the reduced growth rates, a LOAEL of 780 µg/L and an estimated NOAEL of 78 µg/L were identified from this experiment.

Effects of lead on *B. arenarum* embryos was evaluated by Perez-Coll *et al.* (1988). Embryos were exposed to Pb at concentrations of 0, 0.12, 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, or 32.0 mg Pb/L from the two-cell stage onwards. One hundred percent mortality was observed at exposure concentrations of 8.0 mg/L and higher. Calculated 48-hour LC_{50} concentrations for embryos obtained from five different sets of parents ranged from 0.47 to 0.90 mg/L. Exposure concentrations of 2.0 and 4.0 mg/L arrested the development of embryos between the late gastrulae and early neurulae stage. Significant effects on embryo development were observed at exposure concentrations of 0.25 mg/L and greater. A LOAEL of 0.25 mg/L and a NOAEL of 0.12 mg/L were identified from this experiment. These values will be used to evaluate exposure of amphibians to Pb for this risk assessment.

K.5.2 Exposure to Lead in Food

African clawed frogs were fed live earthworms containing Pb at concentrations of 10, 308 or 816 mg/kg wet weight for 4 or 8 weeks (Ireland 1977). Daily total Pb intake was 1.69, 41.02 and 171.04 µg/day/toad; mean weight of toads averaged from 15.4 to 15.6 g for the various groups (exposure concentrations of 0.11, 2.65 and 11 mg/kg body weight (BW)/day, respectively). There were no significant effects on growth rate, hemoglobin, hematocrit, or reticulocyte values at any exposure concentration. Toads fed the highest exposure concentration had significantly lower levels of delta-aminolaevulic acid dehydrase than toads fed the lowest Pb concentration. It should be noted that no control group was included in this experiment. Based on results of this experiment, a NOAEL of 11.0 mg/kgBW/day and an estimated LOAEL of 110 mg/kgBW/day were calculated.

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K.6 Mercury

K.6.1 Mercury in Water

Static acute toxicity tests were conducted to evaluate toxicity of mercury (Hg) to adult male and female Indian bull frogs (*Rana tigerina)* (Mudgall and Patil 1988). Pond water and mercury (as mercuric chloride) solution were renewed every 24 hours. The 96-hour LC_{50} values calculated for male and female frogs were 16.1 and 18.3 mg/L, respectively. A LOAEL of 1.61 mg/L (LC_{50} value converted to a LOAEL using a factor of 10) and an estimated NOAEL of 0.161 mg/L were identified based on the results of this experiment.

K.6.2 Mercury in Sediment

Effects of Hg in sediment on hatchability and development of narrow-mouthed toad eggs were evaluated by Birge *et al*. 1977). Mercury was added to natural stream sediment at nominal concentrations of 0.1, 1.0, 10.0 and 100 mg/kg; measured concentrations were 0.146, 1.188, 12.08 and 122.83 mg/kg. Exposure was initiated at fertilization and was continuous through four to 10 days post-hatching; hatching occurred on developmental day three. Frequencies of mortality and teratogenesis were control adjusted, with values calculated as frequency of response in metal-spiked sediment divided by frequency of response in control sediment. At hatch, percent mortality was 45, 41, 49 and 47% at exposure concentrations of 0.146, 1.188, 12.08 and 122.83 mg/kg, respectively. Teratogenesis was 11, 17, 16 and 23% at the above exposure concentrations. Mortality was measured again at four days post-hatch, and was 61, 52, 64, and 65% at exposure concentrations of 0.146, 1.188, 12.08 and 122.83 mg/kg, respectively. Because embryonic stages suffered higher mortality rates than post-hatch larvae, the authors concluded that sediment metals were more lethal to eggs than to free-living larvae. Based on the increased mortality observed at a sediment concentration of 0.146 mg/kg, this value was identified as the LOAEL. A LOAEL of 0.146 mg/kg and an estimated NOAEL of 0.015 mg/kg will be used to evaluate risk to amphibians from exposure to mercury in sediment.

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K.7 Zinc

K.7.1 Exposure to Zinc in Water

Effects of zinc (Zn) on larval *B. arenarum* survival were studied by Herkovits and Perez-Coll (1991). Fertilized eggs were kept in Holtfreter solution until the end of embryonic development, the completed operculum stage. At that point, larvae were exposed to Zn at concentrations of 0, 4, 8, 16, or 32 mg/L for 120 hours. Survival of larvae exposed to Zn at a concentration of 32 mg/L was significantly lower than control survival (35 versus 100%). A LOAEL of 32 mg/L and a NOAEL of 16 mg/L were identified from this experiment.

Lefcort *et al.* (1998) evaluated effects of Zn on the survival, growth, metamorphosis, and behavior of Columbian spotted frog tadpoles. In the first experiment, tadpoles were exposed to Zn at concentrations of 0, 25, 50 and 100 mg/L to determine a 96-hour LC_{50} value. A 96-hour LC_{50} of 28.38 mg/L was calculated for Zn. In a second experiment, survival, growth and metamorphosis of tadpoles in a mini-ecosystem (containers with sand substrate, dechlorinated tap water, and a measured innoculum of leaf litter, algae and zooplankton) were measured. Exposure concentrations were 0, 0.1, 5 and 20 mg/L Zn (as zinc nitrate hexahydrate). All animals in the high Zn treatment died by the second week of the experiment, and all tadpoles in the medium Zn treatment died by the end of the seventh week. Percent survival in the low Zn treatment was 27.5%. There was no difference in length or time to metamorphosis between low Zn and control tadpoles; control tadpoles weighed significantly more than the low Zn tadpoles at metamorphosis. A third experiment evaluated behavioral response of tadpoles exposed to water that had been in contact with predacious rainbow trout. Due to the early mortality of high Zn tadpoles in the second experiment, this group was not tested. There was no interaction between predator presence and behavior of the Zn-exposed tadpoles. Based on the LC_{50} calculated in the first experiment, a LOAEL of 2.84 mg/L Zn (LC_{50} concentration adjusted to a LOAEL using a conversion factor of 10) and an estimated NOAEL of 0.284 mg/L Zn were identified from this experiment.

Toxicity of Zn (as zinc sulfate) to pre-treated and unexposed *X. laevis* tadpoles was determined in recirculated water systems (Woodall *et al.* 1988). Pre-treated animals were exposed to sub-lethal doses of zinc sulfate at a concentration of 5.0 mg/L for 96 hours. Pretreated and unexposed tadpoles were then exposed to Zn at concentrations of 0, 10, 15 or 20 mg/L for 90 hours. Percent mortality of pre-treated tadpoles exposed at concentrations of 0, 10, 15 or 20 mg/L for 90 hours was 0, 0, 0 and 15%. Percent mortality of unexposed tadpoles exposed at concentrations of 0, 10, 15 or 20 mg/L for 90 hours was 0, 80, 45 and 50%. Prior exposure to sublethal concentrations of Zn protected tadpoles exposed to higher concentrations later, probably due to induction of metallothionein synthesis. A LOAEL of 1 mg/L (exposure concentration at which greater than 50% mortality was observed converted to a LOAEL using a factor of 10) and an estimated NOAEL of 0.1 mg/L were identified based on results of this experiment.

The toxicity of Zn to the gray treefrog and the Northern leopard frog was evaluated by Gottschalk (1995). All experiments were conducted in synthetic soft water (mean hardness

45 of mg/L as $CaCO_3$). Tests were initiated when tadpoles were approximately 8 days old. For the gray treefrog, test exposure concentrations were 0, 2.36, 2.90, 3.52, 4.45, and 5.89 mg/L. The LC_{50} value calculated for tree frogs was 4.696 mg/L. At exposure concentrations of 3.52 mg/L and above, Zn induced abnormal behavior in 30% or more of the tree frogs (loss of equilibrium or thrashy, sporadic or struggled movement), and an exposure concentration of 5.89 mg/L caused tail kinking in 80% of the tadpoles. For the Northern leopard frog, test exposure concentrations were 0, 6.24, 8.0, 9.12, 10.56, 12.0, or 13.44 mg/L. The LC_{50} values calculated for Northern leopard frogs in two definitive tests were 10.2 and 10.48 mg/L. In both experiments with Northern leopard frogs, Zn altered behavior at all exposure concentrations, inducing at least a 70% response at each exposure level. Exposure concentrations of 9.12 mg/L and higher caused tail kinking in 70% or more of the tadpoles. Although the behavioral responses observed following Zn exposure may increase the susceptibility of a tadpole to predation and be an ecologically significant endpoint, the calculated LC_{50} value for the tree frog was selected as the LOAEL. A LOAEL of 0.47 mg/L (LC_{50} value adjusted to a LOAEL using a conversion factor of 10) and an estimated NOAEL of 0.047 mg/L were identified based on the results of this experiment.

The effects of long-term exposure of adult *B. arenarum* females to zinc were evaluated by Naab *et al*. (2001). Adult females were maintained in cages containing Ringer solution or Ringer solution plus Zn at a concentration of 4 µg/L for 28 days. Oocytes from treated and control females were collected and fertilized. Survival of embryos from Zn-treated females was significantly lower at the branchial circulation stage than survival of embryos from control females at the same stage (63.1 and 81.3%, respectively). A LOAEL of 4 µg/L and an estimated NOAEL of 0.4 µg/L were identified from this experiment. These values will be used to evaluate exposure of amphibians to Zn for this risk assessment.

K.7.2 Exposure to Zinc in Sediment

Effects of Zn in sediment on hatchability and development of narrow-mouthed toad eggs were evaluated (Birge *et al*. 1977). Zinc was added to natural stream sediment at nominal concentrations of 0.1, 1.0, 10.0 and 100 mg/kg; measured concentrations were 104.6, 112.6, 124.5 and 222.7 mg/kg. Exposure was initiated at fertilization and was continuous through four to 10 days post-hatching; hatching occurred on developmental day three. Frequencies of mortality and teratogenesis were control adjusted, with values calculated as frequency of response in metal-spiked sediment divided by frequency of response in control sediment. At hatch, percent mortality was 6, 3, 7 and 7% at exposure concentrations of 104.6, 112.6, 124.5 and 222.7 mg/kg, respectively. Percent teratogenesis was 3, 0, 1, and 2% at the above exposure concentrations. Percent mortality was measured again at four days post-hatch, and was 14, 5, 14 and 8% at exposure concentrations of 104.6, 112.6, 124.5 and 222.7 mg/kg, respectively. No significant effects were observed at any sediment exposure concentration; therefore, a NOAEL of 222.7 mg/kg and an estimated LOAEL of 2227 mg/kg were identified for Zn in sediment.

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Appendix L - Life History Profiles
Midnite Mine Site
Wellpinit, Washington

LIFE HISTORIES FOR MIDNITE MINE

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1.0 MAMMALIAN COMMUNITY

1.1 Meadow Vole: Herbivorous Mammal

LIFE HISTORY OF THE MEADOW VOLE (*Microtus pennsylvanicus*)

The meadow vole is one of the largest and most common voles in North America (Merritt 1987; Jones and Birney 1988). It is a relatively long-tailed vole, with a brown to chestnut dorsum and a silvery-gray underbody. Meadow voles are found throughout most of the northern United States and Canada, reaching as far south as New Mexico and Georgia (Merritt 1987). Although they are most commonly found in habitats such as grasslands, moist meadows, bogs, swamps, stream banks, and lake shores, they have also been known to inhabit cultivated fields, roadside ditches, and fencerows (Barbour and Davis 1974; Schwartz and Schwartz 1981; Merritt 1987; Jones and Birney 1988). Dense vegetative cover appears to be one of the major prerequisites for habitation (Jones and Birney 1988; Hoffmeister 1989).

The home range size of the meadow vole varies with season, habitat, and population size, but may cover over one hectare (ha) (Barbour and Davis 1974; Merritt 1987; Jones and Birney 1988). Females generally maintain exclusive home ranges, while the home ranges of males overlap (Madison 1980; Wolff 1985; Ostfeld *et al*. 1988). Populations tend to fluctuate drastically, usually every two to five years, with peak population densities exceeding 250 voles per acre (Barbour and Davis 1974; Merritt 1987; Hoffmeister 1989). Activity occurs during both day and night, and throughout the year; activity is greatest at dawn, dusk, and night (Barbour and Davis 1974; Merritt 1987; Hoffmeister 1989). Well-worn intersecting runways under vegetative cover are distinctive of meadow vole inhabitation (Jones and Birney 1988). Elaborate spherical nests are commonly built above ground in the center of a tussock of grass, although below ground nests are also built in drier areas (Barbour and Davis 1974; Jones and Birney 1988).

The meadow vole is primarily herbivorous, feeding on grasses, sedges, legumes, tubers, seeds, and roots; however, insectivory and cannibalism have been reported (Barbour and Davis 1974; Merritt 1987; Hoffmeister 1989). Bluegrass (*Poa* sp.) is a major component of the diet in some regions (Jones and Birney 1988; Hoffmeister 1989). Meadow voles hoard food for the winter in above- and below-ground caches (Merritt 1987).

The meadow vole is one of the most prolific mammals, producing litter after litter in rapid succession (Barbour and Davis 1974). Breeding occurs during the warmer months of the year, although it may continue year-round, weather permitting (Barbour and Davis 1974; Merritt 1987; Jones and Birney 1988). The gestation period is about 21 days with litter sizes ranging from 1 to 11 (averaging four to seven) young (Barbour and Davis 1974; Jones and Birney 1988). The helpless young mature rapidly and may breed by 25 days of age (Barbour and Davis 1974).

Meadow voles are preyed upon by nearly all species of predatory birds and mammals, including owls, hawks, shrikes, bluejays, crows, foxes, weasels, mink, cats, raccoons, skunks, opossums, shrews, and snakes (Barbour and Davis 1974; Merritt 1987). Due to heavy predation, only a small proportion of the population survives beyond a few months of age (Hoffmeister 1989).

Exposure Profile

Conservative exposure parameters are the highest (ingestion rates) or lowest [body weight (BW), home range size) values found in the literature. Representative exposure parameters are the average of reported values for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) may be higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kilogram (kg) BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult meadow voles weigh from 20 to 71 grams (g), averaging 39.4 g (Connor 1953; Barbehenn 1955; Negus and Findley 1959; Lindsay 1960; Jackson 1961; Myers and Krebs 1971; Soper 1973; Barbour and Davis 1974; Innes and Millar 1979; Rose and Dueser 1980; Reich 1981; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Boonstra and Rodd 1983; Yahner 1983; Merritt 1987; Brochu *et al.* 1988; Gaulin and Fitzgerald 1988; Jones and Birney 1988; Ferkin 1990). The lowest value (0.020 kg) was used as a conservative estimate of BW; the average value (0.0394 kg) was used as a representative estimate of BW.

Meadow voles are nearly entirely herbivorous, though they do consume small amounts of animal matter. Their diet consists of approximately 92 percent (%)vegetation (including seeds and roots), 5% fungi, 2.5% insects, and 0.7% animal flesh (Zimmerman 1965; Lindroth and Batzli 1984). For this risk assessment, the diet of the meadow vole will be assumed to be comprised of 100% vegetation.

The food ingestion rates of non-breeding adult meadow voles eating a diet of mouse chow were reported to be between 4.82 and 5.93 grams per day (g/day) (Innes and Millar 1981; Dark *et al.* 1983). The food ingestion rates of meadow voles eating a powdered synthetic diet, a powdered corn-based diet, and a powdered sorghum-based diet were 4.61, 4.75, and 6.5 g/day, respectively (Williams *et al.* 1978). However, ingestion rates based on relatively dry diets such as these may underestimate the amount of fresh food an animal would consume (U.S. EPA 1993). In fact, ingestion rates may be twice or more as high, depending on the moisture content of the diet (French *et al.* 1955). The moisture content of the natural diet of the meadow vole is approximately 58%, based on the dietary composition presented above and the percent water in the various dietary components (U.S. EPA 1993). To estimate food ingestion of a natural diet, then, ingestion rates of laboratory diets were first converted to food ingestion rates on a dry weight basis as follows: $FIR_{dw} = FIR_{labdiet}$ * [(% solid, lab diet)/100] where FIR_{dw} = food ingestion rate on a dry weight basis and $FIR_{labdiet}$ = food ingestion rate of a dry laboratory diet. The laboratory diet was assumed to have a moisture content of 10% (PMI Nutrition International 1996). The resulting dry matter ingestion rates were then converted to ingestion rates for a natural diet (FIR_{ww}) using a moisture content for the natural diet of the meadow vole of approximately 58%, based on the dietary composition presented above and the percent water in the various dietary components (U.S. EPA 1993). The FIR_{ww} was calculated using the formula: $FIR_{ww} = FIR_{dw}$ /[(% solid, natural diet)/100]. These calculations resulted in fresh food ingestion rates for the meadow vole ranging from 9.9 g/day to 14.1 g/day. The highest ingestion rate (14.1 g/day) was used as a conservative estimate of food ingestion; the average ingestion rate (12 g/day) was used as a representative estimate of food ingestion. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. A conservative food ingestion rate of 5.92 g/day and a representative food ingestion rate of 5.04 g/day were used in this risk assessment.

The water ingestion rate for the meadow vole is reported to be 6.1 milliliters per day (mL/day), or 0.0061 liters per day (L/day) (Ernst 1968). This value was used as both a conservative and a representative water ingestion rate.

Soil ingestion rates of 2.0 and 2.4 percent of the diet (dry weight) have been reported for the meadow vole (Connor 1993; Beyer *et al.* 1994). To calculate soil ingestion in units of g/day (dry weight), the conservative (2.4%) and representative (2.2%) soil ingestion rates were multiplied by the respective dry weight food intake rates (5.92 and 5.04 g/day). These calculations yielded conservative and representative soil ingestion rates of 0.142 g/day and 0.111 g/day (dry weight), respectively.

The home range size of meadow voles varies from 0.00024 ha to 1.3 ha (Douglass 1976; Madison 1980; Merritt 1987; Gaulin and Fitzgerald 1988; Ostfeld *et al.* 1988). The smallest value (0.00024 ha) was used as a conservative estimate of home range size; the average (0.0333 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters for the meadow vole were as follows:

Conservative estimates:

Body weight:	0.02 kg
[1]Total ingestion, dry weight:	0.00592 kg/day
[1]Food ingestion, dry weight:	0.005778 kg/day
Water ingestion:	0.0061 L/day
Soil ingestion, dry weight:	0.000142 kg/day
Home range size:	0.00024 ha

Representative estimates:

Body weight:	0.0394 kg
Total ingestion, dry weight:	0.00504 kg/day
Food ingestion, dry weight:	0.004929kg/day
Water ingestion:	0.0061 L/day
Soil ingestion, dry weight:	0.000111 kg/day
Home range size:	0.0333 ha

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[1]The total ingestion rate is the measured (laboratory or field) or estimated (using an allometric equation) food ingestion rate cited in the paragraph in the exposure profile. Soil ingestion is generally measured as a percent of food ingestion. Therefore, the food ingestion rate used in the food chain models is considered to be equal to the total ingestion rate (listed above) minus the soil ingestion rate.

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1.2 White-tailed Deer: Herbivorous Mammal

LIFE HISTORY OF THE WHITE-TAILED DEER (*Odocoileus virginianus*)

The white-tailed deer is a large ungulate found throughout most of the U.S. with the exception of parts of the west and southwest. The most notable distinguishing characteristic of this species is the white underside of the tail, which becomes clearly visible when the tail is raised in alarm. White-tailed deer generally prefer forest edge, though they may also live in a variety of other habitats, including second-growth forests, agricultural land, brushland, open woods, and forests where selective cutting has allowed the growth of young trees and herbaceous vegetation (Barbour and Davis 1974; Schwartz and Schwartz 1981; Jones and Birney 1988). Habitat use is often related to the amount of cover an area offers. High cover is preferred during the day, whereas less cover is required during crepuscular or nocturnal activity (Jones and Birney 1988).

White-tail deer may forage over a large area, and have home ranges between 16 and 1526 ha in size (Cartwright 1975; Smith 1970; Marshall and Whittington 1969; Merritt 1987). They are active year-round, with most of the activity occurring in the early morning and around dusk (Schwartz and Schwartz 1981; Merritt 1987).

White-tails are highly selective browsers, with their diet strongly reflecting seasonal forage availability. They often choose first those food items that are the most palatable and nutritious (Schwartz and Schwartz 1981). This selectivity diminishes, however, with increasing population size and decreasing food supply (Hoffmeister 1989). During the spring and summer, they browse almost entirely on twigs, leaves, shoots, and fruits (Schwartz and Schwartz 1981; Merritt 1987). During autumn, nuts and fruits form the majority of their diet (Merritt 1987). In winter, buds, leaves, twigs, waste feed, fungi, and lichen are consumed (Schwartz and Schwartz 1981; Merritt 1987). White-tailed deer utilize mineral licks, especially in spring (Schwartz and Schwartz 1981). Additionally, deer require water in some form daily (Schwartz and Schwartz 1981).

The mating season, or rutting, lasts for about two months and takes place in autumn, reaching its peak in November or December (Merritt 1987; Jones and Birney 1988) Most female white-tails are bred by the end of December. The precocial young, usually twins (range 1-3), are born after about a 200-day (approximately 7 months) gestation period (Merritt 1987). Some females may breed at 6 to 8 months of age. Males and the remaining females breed at 1½ years of age (Schwartz and Schwartz 1981; Hoffmeister 1989).

Humans and free-running dogs are the greatest predators of white-tailed deer. Free-running dogs do not usually kill deer, but more often drive them out of their home ranges or into sub-optimal habitat (Schwartz and Schwartz 1981). Bobcats, coyotes, and foxes may occasionally prey on an adult deer, but more often prey on fawns and yearlings (Merritt 1987). Historically, wolves and mountain lions have also preyed on deer and still do in some regions (Schwartz and Schwartz 1981; Jones and Birney 1988). Harsh winters, low food availability, and collisions with autos account for greater mortality than predation by carnivores in many areas (Merritt 1987). Deer live for about 15 years in the wild, or 25 years if under protection (Schwartz and Schwartz 1981). The prime of a white-tailed deer's life is between 2½ to 7½ years of age.

Exposure Profile

Conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Reported body weights for adult white-tailed deer range from 22 to 175 kg, with the average being 68.6 kg (Seton 1929; Hamerstrom and Camburn 1950; Quay 1959; Jackson 1961; Madson 1961; Harlow and Jones 1965; Kelsall 1969; Soper 1973; Barbour and Davis 1974; Roseberry and Klimstra 1975; Sealander 1979; Schwartz and Schwartz 1981; Schmidly 1983; Brisbin and Lenarz 1984; Sauer 1984; Merritt 1987; Jones and Birney 1988; Mech and McRoberts 1990; Nelson and Mech 1990; Leberg *et al.* 1992). Males are larger than females, and deer show a latitudinal cline in body size, with northern deer being larger than southern deer and the smallest deer being found in the Florida keys (Seton 1929; Sauer 1984; Fuller *et al.* 1989; Mech and McRoberts 1990; Nelson and Mech 1990; Leberg *et al.* 1992). A conservative BW of 22 kg and an average BW of 68.6 kg were used in food chain model calculations for this risk assessment.

The diet of the herbivorous white-tailed deer varies with habitat and season. Common food items include the leaves and twigs of various vines, trees, and shrubs, and acorns, corn, milo, soybeans, clover, apples, goldenrod, and grass (Mumford and Whitaker 1982); overall, the diet consists of approximately 47% woody material, 19% acorns and other mast, 13% herbaceous plants, 6% fruit, 5% grasses, 4% corn, 3% fungi, and 3% other or unidentified items (Korschgen 1952; Dahlberg and Guettinger 1956; Harlow and Jones 1965; Sotola and Kirkpatrick 1973). For this risk assessment, white-tailed deer were assumed to be 100% herbivorous.

Reported food ingestion rates for adult white-tail deer eating fresh browse range from 2.05 kg/day to 4.26 kg/day, with the average being 3.2 kg/day (Bateman 1949; French *et al.* 1955; Magruder *et al.* 1958; Ullrey *et al.* 1969; Ozoga and Verme 1970; Ullrey *et al.* 1970). The highest ingestion rate (4.26 kg/d) was identified as a conservative estimate of food ingestion, and an average ingestion rate of 3.08 kg/day was identified as a representative estimate of food ingestion. A moisture content reported for fresh browse (48%; Mautz *et al.* 1976) was used to convert the wet weight food ingestion rates to conservative and representative dry weight food ingestion rates of 2.22 kg/day and 1.60 kg/day, respectively.

Reported water ingestion rates for the white-tailed deer range from 1.4 to 13.5 L/day (Lautier *et al.* 1988). The highest ingestion rate was used as a conservative estimate of water ingestion; the average (3.61 L/day) was used as a representative estimate of water ingestion.

Beyer *et al.* (1994) found the soil ingestion rate of the white-tailed deer to be less than 2 percent of the daily dry matter intake (DMI). Kruelen and Jager (1984), using published measures of deer fecal ash and extrapolating from relationships between fecal ash and soil ingestion established for sheep and cattle, estimated the mean soil ingestion rate of white-tailed deer to be between 5% and 12% of the DMI, and the maximum soil ingestion rate of the white-tailed deer to be 30% of the DMI. To calculate a conservative estimate of soil ingestion in units of g/day (dry weight), the highest soil ingestion rate (30%) was multiplied by the conservative dry matter food ingestion rate (2.22 kg/day), yielding a soil ingestion rate of 0.666 kg/day (dry weight). To calculate a representative estimate of soil ingestion in units of g/day (dry weight), the average soil ingestion estimate (5.2%; calculated using 1.9% to represent a value less than 2% and 8.5% to represent a value between 5% and 12% of the diet) was multiplied by the representative dry matter food ingestion rate (1.60 kg/day), yielding a soil ingestion rate of 0.0832 kg/day (dry weight).

The reported home range sizes of white-tailed deer range from 16 to 1526 ha , with the average being 236 ha (Bridges 1968; Marchinton 1968; Marshall and Whittington 1969; Byford 1970; Smith 1970; Sweeney 1970; Hood 1971; Cartwright 1975; Larson *et al.* 1978; Merritt 1987). The smallest value was used as a conservative estimate of home range size; the average was used as a representative estimate of home range size.

In summary, food chain model parameters used for the white-tailed deer were as follows:

Conservative estimates:

Body weight:	22 kg
Total ingestion, dry weight:	2.22 kg/day
Food ingestion, dry weight:	1.554 kg/day
Water ingestion:	13.5 L/day
Soil ingestion, dry weight:	0.666 kg/day
Home range size:	16 ha

Representative estimates:

Body weight:	68.6 kg
Total ingestion, dry weight:	1.60 kg/day
Food ingestion, dry weight	1.517 kg/day
Water ingestion:	3.61 L/day
Soil ingestion, dry weight:	0.083 kg/d
Home range size:	236 ha

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1.3 Muskrat: Herbivorous Mammal

LIFE HISTORY OF THE MUSKRAT (*Ondatra zibethicus*)

The muskrat is a large, semi-aquatic mammal with rich brown dorsal fur overlain with long guard hairs, a scaly tail, and partly webbed hind feet. It lives virtually anyplace where sufficient food and permanent water is present, including saltwater marshes (Schwartz and Schwartz 1981; Jones and Birney 1988). It can be found throughout most of the U.S., with the exception of Hawaii, Florida, south Texas, and parts of California (Merritt 1987; Schwartz and Schwartz 1981).

Muskrats are primarily nocturnal and are active throughout the year (Merritt 1987). Home ranges vary from 10 to 180 meters' length of shoreline, depending on the size and shape of the water in which the animals live (Merritt 1987), or from 0.0484 ha to 0.39 ha (Neal 1968; Proulx and Gilbert 1983). The home of a muskrat consists of a system of burrows dug into a bank and leading to underwater and above water openings, or a conical lodge comprised of a heap of vegetation and mud (Merritt 1987; Jones and Birney 1981). Each home is usually inhabited by several muskrats, most often members of the same family (Davis and Schmidly 1994). On occasion, other animals such as birds, reptiles, and amphibians may utilize these dens and lodges, even when muskrats are present (Schwartz and Schwartz 1981).

The breeding season of the muskrat varies with regional climate, with northern animals usually producing three to four litters per year and southern animals breeding year-round (Jones and Birney 1988). Gestation periods range from 22 to 31 days, and litters contain from 1 to 16 (averaging 3-8) individuals (Barbour and Davis 1974; Schwartz and Schwartz 1981). Litter sizes are larger in the north, where the average size is 7-8, compared with 6 or less in the south and central portions of the country (Barbour and Davis 1974). Weaning occurs between three and four weeks of age (Schwartz and Schwartz 1981). Sexual maturity is reached in 10 to 12 months (Davis and Schmidly 1994).

Although they may consume meat (including carrion) during times of food scarcity, muskrats are generally herbivorous (Davis and Schmidly 1994; Schwartz and Schwartz 1981). Aquatic vegetation, such as cattails, algae, and sedges, appears to be the favored food item (Davis and Schmidly 1994). Terrestrial vegetation, aquatic invertebrates, fish, frogs, clams, snails, reptiles, young birds, and other muskrats have also been reported to be consumed by muskrats (Jones and Birney 1988; Barbour and Davis 1974; Davis and Schmidly 1994; Schwartz and Schwartz 1981).

The mink is usually the main natural predator of muskrats in most areas (Barbour and Davis 1974; Jones and Birney 1988; Schwartz and Schwartz 1981). Raptors, owls, coyotes, foxes, dogs, cats, raccoons, weasels, large snakes, snapping turtles, and fish also prey on muskrats (Schwartz and Schwartz 1981). Muskrats also carry a heavy parasitic load and as a result may suffer population crashes (Jones and Birney 1988). Only about one-third of young muskrats survive to their first winter (Schwartz and Schwartz 1981). One tagged muskrat was reported to survive for four years in the wild (Schwartz and Schwartz 1981).

Exposure Profile

For the purpose of this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult muskrats weigh from 0.541 kg to 1.814 kg, with the average being 1.191 kg (Dozier 1948; Beer and Meyer 1951; Fuller 1951; Stevens 1953; Reeves and Williams 1956; Wilson 1956; Donohoe 1961; Erickson 1963; Neal 1968; Barbour and Davis 1974; Schacher and Pelton 1978; Parker and Maxwell 1980; McDonnell and Gilbert 1981; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Baker 1983; Parker and Maxwell 1984; Merritt 1987; Jones and Birney 1988; Davis and Schmidly 1994). Males are generally larger than females. There is also regional variation in muskrat body size: muskrats are usually heavier in northern latitudes, although the smallest body sizes are found in Idaho (Reeves and Williams 1956). For this risk assessment, a conservative BW of 0.541 kg and a representative BW of 1.191 were used in exposure calculations.

Muskrats are primarily herbivorous, though they will eat animal matter on occasion (Jones and Birney 1988; Barbour and Davis 1974; Davis and Schmidly 1994; Schwartz and Schwartz 1981). Muskrat generally eat different plant food items in proportion to their availability in the habitat (Takos 1947). Often, one or two food items, the selection of which varies with habitat, will comprise 70-80% of the diet. The diet of muskrats in Maryland was found to consist of approximately 50% green algae, 46% other green vegetation (primarily cattails, other rushes, and sedges), 3% corn, millet, and other seeds, and 1% other items (Willner *et al.* 1975). In other regions, cattails are reported to be the mainstay of the muskrat diet (Davis and Schmidly 1994; Schwartz and Schwartz 1981). For this risk assessment, muskrats were considered to be 100% herbivorous.

Food ingestion rates measured for the muskrat range from 0.26 to 0.34 grams per gram BW per day (g/g/day) (Svihla and Svihla 1931). To calculate a conservative estimate of food ingestion in units of g/day, the highest food ingestion rate (0.34 g/g/day) was multiplied by the lowest reported BW, yielding a value of 0.184 kg/day. To calculate a representative estimate of food ingestion in units of g/day, the average food ingestion rate (0.31 g/g/day) was multiplied by the average BW, yielding a value of 0.369 kg/day. These values were used in exposure calculations for this risk assessment.

Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.099 $Wt^{0.90}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.057 L/day and a representative water ingestion rate of 0.116 L/day were calculated and used in exposure calculations.

A soil ingestion estimate for the muskrat could not be found in the literature; however, Willner *et al.* (1975) reported that, on average, 1% of the muskrat diet was composed of material other than vegetation. This value will be assumed to represent the percentage of soil ingested by the muskrat. Because the dietary composition of the muskrat was reported on a wet weight basis, the soil ingestion rate of 1% cannot be converted to a dry weight measure without knowing the moisture content of the soil/sediment ingested. Therefore, to calculate soil ingestion rates for the muskrat in units of g/day, the soil ingestion estimate of 1% was multiplied by the conservative and representative wet matter food ingestion rates to obtain soil intake rates of 1.84 g/day and 3.69 g/day (wet weight), respectively. Inputting wet weight soil ingestion rates into the exposure models will result in more conservative (i.e., higher) estimates of risk.

Muskrat home ranges have been reported to vary from 0.0484 ha to 0.39 ha (Neal 1968; Proulx and Gilbert 1983). The lowest value was used as a conservative estimate of home range size, and the average value (0.19 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters used for the muskrat were as follows:

Conservative estimates:

Body weight:	0.541 kg
Total ingestion:	0.184 kg/day
Food ingestion:	0.18216 kg/day
Water ingestion:	0.057 L/day
Soil ingestion:	0.00184 kg/day
Home range size:	0.0484 ha

Representative estimates:

Body weight:	1.191 kg
Total ingestion:	0.369 kg/day
Food ingestion:	0.36531 kg/day
Water ingestion:	0.116 L/day
Soil ingestion:	0.00369 kg/day
Home range size:	0.19 ha

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1.4 Coyote: Carnivorous Mammal

LIFE HISTORY OF THE COYOTE (*Canis latrans*)

Coyotes occur throughout most of North America. They are similar to domestic dogs and resemble a small German Shepherd in shape. Their fur is light gray to dull yellow, with the outer hairs tipped with black. The tail is long and bushy, and carried straight down below the level of the back. Adults weigh from 15 to 50 pounds (7-23 kg), with males being somewhat larger than females, and eastern and northern animals being larger than western and southern animals (Rue 1981; Merritt 1987; Hoffmeister 1989; Nowak 1991). Coyotes prefer open brush, woodland borders, fields, and open farmlands (Barbour and Davis 1974; Schwartz and Schwartz 1981; Hoffmeister 1989). Their population size and range have increased in recent decades due to land use practices, the coyote's adaptability and aggressive nature, and the decline of other predators such as wolves (Barbour and Davis 1974; Rue 1981; Schwartz and Schwartz 1981; Bekoff 1982; Nowak 1991; Davis and Schmidly 1994).

Coyotes are primarily crepuscular or nocturnal, though they are sometimes active during the day, especially in summer (Schwartz and Schwartz 1981; Bekoff 1982; Merritt 1987; Nowak 1991). They are active throughout the year. They usually either live alone, in male-female pairs, or in family groups, although they may form packs (Bekoff 1982; Davis and Schmidly 1994). Home range sizes from 0.3 to 233 km^2 have been reported for this species (Berg and Chesness 1978; Rue 1981; Schwartz and Schwartz 1981; Bowen 1982; Pyrah 1984). Territories are smaller while the young are being fed and larger during other times of the year (Schwartz and Schwartz 1981). In some areas, coyotes may migrate to high country in the summer and to valleys in the fall (Nowak 1991).

Coyotes may sleep directly on the ground in a protected spot, but have one or more dens for the young during breeding season. Dens are usually in brush, thickets, hollow logs, burrows, or on rocky ledges or crevices, and often have more than one entrance with interconnecting tunnels (Barbour and Davis 1974; Bekoff 1982; Nowak 1991). Coyotes usually dig their own dens, but they may also enlarge an old badger hole or den in natural holes in rocky ledges. The mating season of the coyote extends from January to March, peaking in February (Barbour and Davis 1974). Gestation lasts 58 - 63 days, after which 2-19 (average 5 - 7) young are born (Barbour and Davis 1974; Schwartz and Schwartz 1981; Hoffmeister 1989). Both parents care for the young, which are weaned at approximately 8 weeks of age (Schwartz and Schwartz 1981). Some coyotes may breed at 10-12 months of age, but most do not breed until they are two (Rue 1981; Schwartz and Schwartz 1981).

Coyotes eat primarily animal food, with small mammals (rabbits and mice) comprising 2/3 of their diet (Schwartz and Schwartz 1981; Hoffmeister 1989). They also eat poultry and other birds, carrion, insects, woodchucks, fruit, crayfish, skunks, raccoons, fish, amphibians, deer, and livestock. Most larger prey items are consumed as carrion (Bekoff 1982; Hoffmeister 1989; Nowak 1991). Plant matter may be seasonally important (Schwartz and Schwartz 1981). Coyotes will cache food when it is plentiful (Schwartz and Schwartz 1981; Merritt 1987).

Young coyotes may be preyed upon by bears, mountain lions, eagles, owls, hawks, dogs, wolves, and other coyotes (Rue 1981; Schwartz and Schwartz 1981; Davis and Schmidly 1994). Most mortality among adults is from hunting, trapping, or disease. Coyotes usually live less than 10 years in the wild, though they may live up to 18 years in captivity (Schwartz and Schwartz 1981; Merritt 1987; Jones and Birney 1988).

Exposure Profile

Conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Body weights reported for adult coyotes range from 7.0 to 22.7 kg (Hawthorne 1971; Barbour and Davis 1974; Gier 1975; Bekoff 1977; Rue 1981; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Huegel and Rongstad 1985; Moore and Millar 1986; Merritt 1987; Jones and Birney 1988; Windberg *et al.* 1991; Davis and Schmidly 1994; Poulle *et al.* 1995). A conservative BW of 7.0 kg and a representative BW of 13.3 kg were used for this risk assessment.

Coyotes are mostly carnivorous, though they do consume some plant matter. Their diet consists of approximately 95% animal matter and 5% plant or other material (Barbour and Davis 1974; Nellis and Keith 1976; Schwartz and Schwartz 1981; Merritt 1987; Hoffmeister 1989; Nowak 1991; Davis and Schmidly 1994). For this risk assessment, a coyote will be assumed to be 100% carnivorous.

Several papers were located that cited a food ingestion rate for the coyote. Food ingestion rates ranging from 0.37 kg/day to 1.4 kg/day were reported for this species (Gier 1975; Litvaitis and Mautz 1980; Rue 1981; Huegel and Rongstad 1985). A conservative food ingestion rate of 1.4 kg/day and a representative food ingestion rate of 0.83 kg/day were identified. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value of 0.31, calculated based on the dietary composition of the coyote and the water contents of various wildlife foods, presented in U.S. EPA (1993). A conservative food ingestion rate of 0.434 kg/day dry weight and a representative food ingestion rate of 0.257 kg/day dry weight were used in this risk assessment.

A species-specific water ingestion rate could not be located for the coyote. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.099 Wt $^{0.90}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.57 L/day and a representative water ingestion rate of 1.02 L/day were calculated.

A soil ingestion rate for the coyote could not be located. A soil ingestion rate for red fox (2.8% of the dry matter intake; Beyer *et al.* 1994) was used for the coyote, based on the similarity in diet of the two species (mainly carnivorous but including plant material). To calculate soil ingestion rates for the coyote in units of g/day (dry weight), the soil ingestion estimate for the red fox was multiplied by the conservative and representative dry weight food intake rates for the coyote (0.434 and 0.257 kg/day, respectively). This yielded conservative and representative soil ingestion estimates of 0.0122 kg/day and 0.0072 kg/day dry weight, respectively.

Coyotes establish and actively defend territories, either singly, in pairs, or as a pack. Home range sizes from 0.3 to 233 km^2 (30 to 23,300 ha) have been reported for adult coyotes (Berg and Chesness 1978; Litvaitis and Shaw 1980; Rue 1981; Schwartz and Schwartz 1981; Bowen 1982; Pyrah 1984; Smith et al 1981). The smallest reported home range, 0.3 km^2, was estimated based on the area around a den site used by a pack during the summer in Montana (Pyrah 1984). A conservative home range size of 0.3 km^2 and a representative home range size of 25.9 km^2 (30 and 2590 ha, respectively), will be used for this risk assessment.

In summary, food chain model parameters used for the coyote were as follows:

Conservative estimates:

Body weight:	7.0 kg
Total ingestion, dry weight:	0.434 kg/day
Food ingestion, dry weight:	0.4218 kg/day
Water ingestion:	0.57 L/day
Soil ingestion, dry weight:	0.0122 kg/day
Home range size:	30 ha

Representative estimates:

Body weight:	13.3 kg
Total ingestion, dry weight:	0.257 kg/day
Food ingestion, dry weight:	0.2498 kg/day
Water ingestion:	1.02 L/day
Soil ingestion, dry weight:	0.0072 kg/day
Home range size:	2590 ha

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1.5 Bobcat: Carnivorous Mammal

LIFE HISTORY OF THE BOBCAT (*Lynx rufus*)

Bobcats are found throughout North America from southern Canada to southern Mexico. In the United States, population densities are higher in the southeastern region than in the western states (Ciszek 2002). They are found in almost all kinds of habitat, including forest, deserts, mountains and brushland. Bobcats generally prefer rough, rocky country interspersed with dense cover (Ciszek 2002). Large, intensively cultivated areas and metropolitan areas appear to be the only unsuitable habitat for this species. Prey abundance; protection from severe weather; availability of cover, resting, and denning sites; and freedom from human intrusion are important factors in bobcat habitat selection (McCord and Cardoza 1982).

Bobcats are various shades of buff and brown. The upper body is generally reddish brown streaked with black, and the under parts are whitish with black spots. The backs of the ears are black with white in the center. The tail is short [11 to 19 centimeter (cm); Ciszek 2002], with a black end tipped with white. They have short ear tufts and long hair on the sides of the head, producing a ruff. The bobcat has relatively long legs and large paws.

Bobcats are basically terrestrial and nocturnal, although they can climb trees and may be active day and night. Crepuscular activity peaks have been reported (Anderson 1987; Rolley 1987) . Bobcats are solitary animals. Males and females interact almost exclusively during the mating season. Bobcats do not dig their own dens, but will den in crevices, caves, dense brush thickets, or hollow trees.

Bobcats are generally not sexually mature until their second year. Females normally produce only one litter per year, however if a litter is lost females are capable of producing a second litter (Anderson 1987). Pregnancy rates may decline in periods of low prey density (Rolley 1985). Bobcats usually mate in the spring, and the gestation period is 60 to 70 days. Young are usually born in April or May. The average litter consists of two or three kittens, but may be as large as eight. The kittens open their eyes after 10 days and are raised by their mother until they are 9 or 10 months old. The father has no role in raising the offspring (Royo 1996; IUCN 1996; Ciszek 2002) .

Bobcats are strictly carnivorous. They are opportunistic hunters, and will take any prey available, including insects, fish, amphibians, reptiles, birds and mammals. Their food consists primarily of small mammals and birds; cottontail rabbits are a favored prey item (McCord and Cardoza 1982; Anderson 1987). Bobcats most frequently kill animals weighing 0.7 to 5.5 kg (Rosenzweig 1966). Grass has been reported in several scat studies, however it passes through the digestive tract without being digested (Brittell *et al.* 1979; Buttrey 1979; Story *et al.* 1982); whether ingestion is incidental or intentional is not known.

Bobcats in captivity have been known to live as long as 25 years. Longevity in the wild is generally 2 to 5 years, although some individuals may live 12 to 13 years (Crowe 1975). Juvenile survival rates appear to be strongly influenced by prey abundance (Rolley 1985; Anderson 1987). Adult bobcats are not commonly preyed upon, but kittens may be taken by foxes, owls, mountain lions, eagles, or coyotes. Bobcats may be killed or injured while hunting, and diseases including notoedric mange, rabies, and feline panleucopenia can cause deaths (Wilson and Ruff 1999). Hunting or trapping by humans is an important cause of mortality, but it is not known whether human harvest is an additive or compensatory source of mortality (Anderson 1987).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range) values found in the literature. Representative exposure parameters are the average of the values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

The BW of adult bobcats ranges from 3.8 to 31 kg (Pollack 1949; Erickson 1955; Van Wormer 1963; Golley *et al*. 1965; Soper 1973; Crowe 1975; McKinney and Dunbar 1976; Epperson 1978; Fritts and Sealander 1978; Berg 1979; Buttrey 1979; Kitchings and Story 1979; Zezulak and Schwab 1979; Olin 1982; Rolley 1983; Gustafson 1984; Kitchings and Story 1984; Litvaitis *et al*. 1984; Nowak 1991; Kobalenko 1997; Wilson and Ruff 1999). Male bobcats are generally about 33% larger in BW than adult females, and northern animals tend to be larger than those from southern areas (McCord and Cardoza 1982). A conservative BW of 3.8 kg and a representative BW of 9.2 kg were used in this risk assessment.

The bobcat is an opportunistic predator and will eat anything available, including small mammals, rabbits, deer, fish, reptiles, amphibians or insects (Fritts and Sealander 1978; Litvatis el al 1984; Rolley 1983; Epperson 1978) . Lagomorphs are the dominant prey identified in many food habit studies (Bailey 1979; Berg 1979; Trevor *et al.* 1989), with small mammals also reported as an important prey item. Several studies have found grass and other vegetation being consumed by bobcats (Brittell *et al.* 1979; Buttrey 1979; Story *et al.* 1982); whether ingestion of vegetation is incidental to prey consumption or intentional is not known. For this risk assessment, it will be assumed that bobcats are 100 percent carnivorous.

Food ingestion rates ranging from 340 to 999 g/day have been measured for adult bobcats (Golley *et al.* 1965; Gustafson 1984; Powers 1984). Prey species has a significant effect on the amount of food consumed per day; the lowest daily consumption rates were measured using highly digestible diets with high fat and metabolizable energy content (e.g., deer). A conservative food ingestion rate of 999 g/day and a representative food ingestion rate of 611 g/day were identified. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value of 0.31, calculated based on the dietary composition of the bobcat and the water contents of various wildlife foods, presented in U.S. EPA (1993). A conservative food ingestion rate of 0.310 kg/day dry weight and a representative food ingestion rate of 0.189 kg/day dry weight were used in this risk assessment.

A species specific water ingestion rate could not be located for the bobcat. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.099 Wt $^{0.90}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.329 L/day and a representative water ingestion rate of 0.730 L/day were calculated.

A soil ingestion rate for bobcat could not be located. A soil ingestion rate for red fox (2.8% of the dry matter intake; Beyer *et al.* 1994) will be used for the bobcat, based on their similar diets (mainly carnivorous). To calculate soil ingestion rates for the bobcat in units of g/day (dry weight), the soil ingestion estimate for the red fox was multiplied by the conservative and representative dry weight food intake rates for the bobcat (0.31 and 0.189 kg/day, respectively). This yielded conservative and representative soil ingestion estimates of 8.67 g/day and 5.3 g/day (dry weight), respectively.

Adult bobcats usually have a home range that is well defined but varies in size depending on prey density, sex, season and climate. Males tend to have larger home range sizes than females. Females tend not to have home ranges that overlap ranges of other females, but female and male home ranges do overlap. Home range sizes from 0.85 to 201 km^2 have been reported for bobcats (Hall and Newsom 1976; Berg 1979; Brittell *et al.* 1979; Buie *et al.* 1979; Kitchings and Story 1979; Lembeck and Gould 1979; Miller and Speake 1979; Rolley 1983; Kitchings and Story 1984; Lawhead 1984; Knowles 1985; Zezulak and Schwab 1979). A conservative home range of 0.85 km^2 and a representative home range of 19.3 km^2 (85 and 1930 ha, respectively) were used for this risk assessment.

In summary, food chain model parameters used for the bobcat were as follows:

Conservative Scenario:

Body weight:	3.8 kg
Total ingestion, dry weight:	0.310 kg/day
Food ingestion, dry weight:	0.30132 kg/day
Water ingestion:	0.329 L/day
Soil ingestion, dry weight:	0.00868 kg/day
Home range:	85 ha

Representative Scenario:

Body weight:	9.2 kg
Total ingestion, dry weight:	0.189 kg/day
Food ingestion, dry weight:	0.18371 kg/day
Water ingestion:	0.730 L/day
Soil ingestion, dry weight:	0.00529 kg/day
Home range:	1,930 ha

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1.6 Masked Shrew: Soil Invertebrate Feeding Mammal

LIFE HISTORY OF THE MASKED SHREW (*Sorex cinereus*)

Masked shrews are small, insect-eating mammals (Order Insectivora) with grayish brown to brownish black to black dorsal fur and tan or dusky feet. Though not always apparent, there may be a darker coloration over the eyes, for which the animals are named. Masked shrews are distinguished from other shrews by their color and by having a longer tail (Schwartz and Schwartz 1981). They range from Alaska and Canada south into the northern half of the U.S. While they are generally relatively scarce over this range, they may be very abundant in certain areas (Schwartz and Schwartz 1981). Though their range overlaps with that of least (*Cryptotis parva*) and short-tailed (*Blarina brevicauda*) shrews, masked shrews have a more restricted habitat preference, primarily using moist areas, such as low stream valleys or flood plains, with good ground cover (Hoffmeister 1989).

Masked shrews dig burrows that are approximately 2 cm in diameter and which may descend about 23 inches. Their tunnel systems may have several chambers, including ones for food storage, resting, and nesting. Masked shrews are mostly nocturnal, though they may be active during the day as well (Merritt 1987). They do not hibernate but are especially active after a rain or on warm or cloudy nights (Schwartz and Schwartz 1981; Jones and Birney 1988). Home range size varies from 0.2 to 0.6 ha (Baker 1983; Merritt 1987).

Masked shrews usually find their food by touch and smell rather than by sight (Merritt 1987). They do not cache food. Nearly all of the diet of the masked shrew consists of insects and other invertebrates including butterfly, moth, and beetle larvae, centipedes, slugs, snails, and spiders, but they will occasionally eat earthworms, fungi, plant matter, and small vertebrates such as salamanders and mice (Whitaker and Mumford 1972; Barbour and Davis 1974; Schwartz and Schwartz 1981; Merritt 1987; Jones and Birney 1988). Due to their high metabolic rate, food consumption rates are high. Morrison *et al*. (1957) and Schwartz and Schwartz (1981) have estimated that wild shrews may consume 2.5 to 3 times their BW daily, respectively.

Masked shrews breed between March and September and have a gestation period of 18 days (Schwartz and Schwartz 1981; Hoffmeister 1989). They may have several litters, each consisting of 4 to 10 (averaging 7) individuals, per season (Barbour and Davis 1974; Schwartz and Schwartz 1981). A female may be nursing one litter and pregnant with another. Masked shrews produce their first litter in the fall of their first year (Schwartz and Schwartz 1981).

Mortality among masked shrews is greatest during the first 2 months of life. Excessive rainfall and wetness may be the major cause of death in the nest. Hawks, owls, shrikes, herons, foxes, weasels, snakes, cats, large frogs, short-tailed shrews, and even fish all feed on masked shrews (Schwartz and Schwartz 1981; Merritt 1987; Jones and Birney 1988). The maximum life span of a masked shrew is usually 12 - 18 months in the wild and 2 years in captivity (Schwartz and Schwartz 1981; Merritt 1987).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average or midpoint of the range (as indicated below) of values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult masked shrews weigh from 2 to 7.8 g, averaging 4.28 g (Connor 1953; Smith and Foster 1957; Lindsay 1960; Short 1961; Sealander 1964; Grodzinski 1971; Soper 1973; Forsyth 1976; Wrigley *et al.* 1979; Mumford and Whitaker 1982; Baker 1983; Innes *et al.* 1990). The lowest value (0.002 kg) was used as a conservative estimate of BW; the average value (0.00428 kg) was used as a representative estimate of BW.

Masked shrews are voracious feeders. Their diet is composed nearly entirely of animal matter, including approximately 68% insects, 5.6% molluscs, 4.5% arachnids, 4.3% centipedes, 3.9% annelids, 3.9% vertebrates, 1.6% sowbugs, 0.7% vegetation, 0.5% inorganic matter, 0.5% fungi, and 6% other or unidentified (Hamilton 1930; Whitaker and Mumford 1972). For this risk assessment, it was assumes that the diet of a masked shrew was 100% comprised of invertebrate prey.

Food ingestion rates ranging from 4.35 to 12.86 g/day have been reported for masked shrews (Blossom 1932; Morrison *et al.* 1957; Buckner 1964). A conservative food ingestion rate of 12.86 and a representative food ingestion rate of 6.44 g/day were calculated. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value of 0.35, calculated based on the dietary composition of the masked shrew and the water contents of various wildlife foods, presented in U.S. EPA (1993). A conservative food ingestion rate of 0.0045 kg/day dry weight and a representative food ingestion rate of 0.00299 kg/day dry weight were used in this risk assessment.

A water ingestion rate could not be found for the masked shrew; therefore, the water ingestion rates of a closely related species, the short-tailed shrew, were used. Both short-tailed and masked shrews construct and or use underground tunnel systems in similar or overlapping habitats, have extremely high metabolic rates, and consume primarily invertebrates (Hamilton 1930; Whitaker and Mumford 1972; Schwartz and Schwartz 1981; Hoffmeister 1989). Deavers and Hudson (1979) estimated water ingestion at 20 degrees Celsius (°C) by short-tailed shrews averaging 23.1 g to be 0.0139 L/day; ingestion at 5 degrees C by short-tailed shrews averaging 23.5g was estimated to be 0.0184 L/day. Chew (1951) estimated water ingestion at 18.7 °C by short-tailed shrews averaging 25.76 g to be 0.0057 L/day. Edgren (1948) measured water ingestion by a shrew weighing 14.8 g to be 0.009 L/day. To calculate water ingestion rates for the masked shrew, short-tailed shrew water ingestion rates were divided by the short-tailed shrew body weights yielding an ingestion rate based on mL/g BW/day. To calculate a conservative water ingestion rate the lowest masked shrew BW of 2 g was multiplied by the highest short-tailed shrew water ingestion rate of 0.783 mL/g BW/day, yielding 1.57 mL/day or 0.00157 L/day. To calculate a representative masked shrew water ingestion rate, the average masked shrew BW of 4.23 g was multiplied by the average short-tailed shrew water ingestion rate of 0.547 mL/g BW/day yielding a representative water ingestion rate of 2.31 mL/day or 0.00231 L/day.

A soil ingestion estimate for the masked shrew was not available from the literature; therefore, based on the similarity of their diets, the soil ingestion estimate for the short-tailed shrew was used. Connor (1993) reported soil ingestion by the short-tailed shrew to be 5.2 percent of the dry weight food intake. To calculate soil ingestion rates for the masked shrew in units of g/day (dry weight), the soil ingestion estimate for the short-tailed shrew was multiplied by the conservative and representative dry weight food intake rates for the masked shrew (4.5 and 2.99 g/day, respectively). This yielded conservative and representative soil ingestion rates of 0.234 g/day and 0.155 g/day (dry weight), respectively.
Home range size of the masked shrew varies from 0.02 to 0.06 ha (Baker 1983; Merritt 1987). The lowest value (0.02 ha) was used as a conservative estimate of home range size; the midpoint of the range (0.04 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters used for the masked shrew were as follows:

Conservative estimates:

Body weight:	0.002 kg
Total ingestion, dry weight:	0.0045 kg/day
Food ingestion, dry weight:	0.004266 kg/day
Water ingestion:	0.00157 L/day
Soil ingestion, dry weight:	0.000234 kg/day
Home range size:	0.02 ha

Representative estimates:

Body weight:	0.00428 kg
Total ingestion, dry weight:	0.00299 kg/day
Food ingestion, dry weight:	0.002835 kg/day
Water ingestion (weighted average):	0.00231 L/day
Soil ingestion, dry weight (average):	0.000155 kg/day
Home range size:	0.04 ha

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1.7 Deer Mouse: Omnivorous Mammal

LIFE HISTORY OF THE DEER MOUSE (*Peromyscus maniculatus*)

The deer mouse is very similar to the white-footed mouse in appearance. Its dorsum is brown to reddish brown, its underparts white. Compared to the white-footed mouse, it has a slightly smaller body, hind foot, and ear, a longer tail relative to the head and body, a more distinct tuft at the distal end of the tail, and more distinct bicoloration between the dorsal and ventral surfaces of the tail (Schwartz and Schwartz 1981; Merritt 1987). The deer mouse has one of the broadest distributions of any small terrestrial mammal in North America, being found throughout most of the continental U.S. except the southeastern states (Schwartz and Schwartz 1981; Merritt 1987; Jones and Birney 1988).

There are three subspecies of deer mouse in the United States, *P. maniculatus bairdii* (prairie deer mouse), *P. maniculatus nubiterrae* (cloudland deer mouse), and *P. maniculatus gracilis* (woodland deer mouse). They will be discussed as a single species here; however, since large differences in some aspects of their life histories exist, these differences will also be noted.

The prairie deer mouse (*bairdii*) inhabits open habitats such as grassy areas, weedy fields, fencerows, roadsides, and other early-successional areas (Schwartz and Schwartz 1981; Merritt 1987). This subspecies is seldom found in wet woods, swampy lowlands, or heavy brush (Schwartz and Schwartz 1981; Jones and Birney 1988). The cloudland deer mouse (*nubiterrae*) inhabits cool, moist hardwood forests and swamps, and is often associated with fallen logs, rocks, and mossy stream banks (Barbour and Davis 1974; Merritt 1987). The woodland deer mouse (*gracilis*) is partly arboreal and inhabits cool, moist hardwood and coniferous forests at high elevations (Merritt 1987; Jones and Birney 1988).

The home ranges of deer mice vary in size from 0.01 ha to 2 ha, and seldom overlap with those of the closely related white-footed mouse (*P. leucopus*). Deer mice are primarily nocturnal and do not create distinct runways (Barbour and Davis 1974; Schwartz and Schwartz 1981). Nests are spherical and relatively large for the animal's size, with a single side entrance that is closed from the inside (Barbour and Davis 1974; Schwartz and Schwartz 1981). These nests are usually located at or below the ground surface, in cavities at the base of trees, in shrub roots, under logs or rocks, or in an existing animal burrow (Schwartz and Schwartz 1981). Nests are sometimes placed aboveground, in trees, fenceposts, or old bird nests (Schwartz and Schwartz 1981). During extremely cold weather, the deer mouse may undergo torpidity or employ communal nesting. Two to five individuals, usually all deer mice but on occasion including some white-footed mice, will huddle to conserve energy by sharing their body heat (Merritt 1987).

Deer mice are opportunistic omnivores, consuming insects, nuts, seeds, domestic grain, fruits, green vegetation, soil invertebrates, and animal carcasses (Schwartz and Schwartz 1981; Hoffmeister 1989). In the fall, food is transported in the mouth or cheek pouches to storehouses below ground that serve as important food sources during harsh weather (Merritt 1987).

Breeding occurs mostly in the spring and fall, but has been reported to take place throughout the year (Schwartz and Schwartz 1981). Gestation lasts from 21 to 27 days, and may extend to 37 days in lactating females (Barbour and Davis 1974; Schwartz and Schwartz 1981). Litter size is one to nine (usually three to six), with females reaching breeding age by 46 to 51 days (Barbour and Davis 1974; Schwartz and Schwartz 1981).

Deer mice are abundant enough to form a ready supply of food for carnivorous predators (Schwartz and Schwartz 1981). They are preyed on by opossums, shrews, foxes, coyotes, weasels, skunks, mink, badgers, bobcats, domestic and feral cats, hawks, owls, and snakes (Schwartz and Schwartz 1981; Merritt 1987). Deer mice may live as long as two years, although generally less than one-fifth of those born reach maturity (Schwartz and Schwartz 1981).

Exposure Profile

Conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult deer mice weigh from 9 to 33.2 grams, with the average weight being 18.5 g (Jameson 1953; Lindsay 1960; Sealander 1964; Svendsen 1964; Fordham 1971; Soper 1973; Barbour and Davis 1974; Flake 1974; Bowers and Smith 1979; Sealander 1979; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Feldhamer *et al*. 1983; Wolff 1985a; Merritt 1987; Jones and Birney 1988; Kenagy and Barnes 1988; Doyle 1990). There is some variation in body size among different populations and subspecies, but no clear regional trends. The lowest reported value (0.009 kg) was used as a conservative estimate of BW; the average value (0.0185 kg) was used as a representative estimate of BW.

The diet of the deer mouse consists of approximately 41% invertebrates, 35% seeds, 18% vegetation, 3% fungi, and 3% other or unidentified matter (Whitaker 1966; Flake 1973; Martell and MacAuley 1981; van Horne 1982; Sieg *et al*. 1986). For this risk assessment, the deer mouse will be assumed to consume 42% invertebrates and 58% plant matter.

Most studies of food ingestion rates in deer mice were done in a laboratory setting, with mice being fed a diet of lab chow or seeds and dry grains (Dice 1922; Sealander 1952; Drickamer 1970; Stebbins 1978; Glazier 1985; Green and Millar 1987), all of which contain about 10% water (Dice 1922; U.S. EPA 1993; PMI Nutrition International 1996). However, ingestion rates based on relatively dry diets such as these may underestimate the amount of fresh food an animal would consume (U.S. EPA 1993). In fact, ingestion rates may be twice or more as high, depending on the moisture content of the diet (French *et al*. 1955). The moisture content of the natural diet of deer mice is approximately 48%, based on the dietary composition presented above and the percent water in the various dietary components (U.S. EPA 1993).

To estimate food ingestion of a natural diet, then, ingestion rates of laboratory diets were first converted to food ingestion rates on a dry weight basis as follows: $FIR_{dw} = FIR_{labdiet} * [(\% \text{ solid, lab diet})/100]$ where FIR_{dw}

= food ingestion rate on a dry weight basis and $FIR_{labdiet}$ = food ingestion rate of a dry laboratory diet. The laboratory diet was assumed to have a moisture content of 10% (PMI Nutrition International 1996). The resulting dry matter ingestion rates were then converted to ingestion rates for a natural diet (FIR_{ww}) using a moisture content for the natural diet of the meadow vole of approximately 58%, based on the dietary composition presented above and the percent water in the various dietary components (U.S. EPA 1993). The FIR_{ww} was calculated using the formula: $FIR_{ww} = FIR_{dw}$ /[(% solid, natural diet)/100]. These calculations resulted in fresh food ingestion rates for the deer mouse ranging from 2.13 g/day to 11.6 g/day. The highest ingestion rate was identified as a conservative estimate of food ingestion (11.6 g/day); the average ingestion rate (6.74 g/d) was identified as a representative estimate of food ingestion. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. A conservative food ingestion rate of 6.03 g/day and a representative food ingestion rate of 3.5 g/day were used in this risk assessment.

Reported water ingestion rates for adult deer mice range from 0.00107 to 0.00378 L/day (Dice 1922; Lindeborg 1950). The highest ingestion rate (0.00378 L/day) was used as a conservative estimate of water ingestion; the average of reported water ingestion rates (0.00229 L/day) was used as a representative estimate of water ingestion.

A soil ingestion estimate for the deer mouse could not be found in the literature; therefore, the soil ingestion estimates for a closely related species, the white-footed mouse, were used to derive the soil ingestion rate of the deer mouse. The average BW and omnivorous feeding patterns of the white-footed mouse are similar to those of the deer mouse (Merritt 1987; U.S. EPA 1993). In one study, the soil ingestion rate for the white-footed mouse was reported to be less than 2 percent of the dry weight food intake (Beyer *et al*. 1994); another study found the rate of soil ingestion to be 16.2% of the dry weight food intake (Connor 1993). The highest value (16.2%) was used as a conservative estimate of soil ingestion; the average (9.05%) was used as a representative estimate of soil ingestion (using a value of 1.9% to represent <2% of the diet). To calculate soil ingestion rates for the deer mouse in units of g/day (dry weight), the soil ingestion estimates for the white-footed mouse were multiplied by the conservative and representative dry weight food intake rates for the deer mouse (6.03 and 3.5 g/day, respectively). This yielded conservative and representative soil ingestion rates of 0.977 and 0.317 g/day (dry weight), respectively.

The home range of the deer mouse generally ranges from 0.01 ha to 1 ha in size, but is occasionally as large as 2 ha (Merritt 1987; Schwartz and Schwartz 1981). The smallest reported value was used as a conservative estimate of home range size. The average (0.19 ha) of reported mean values (Fitch 1958; Bowers and Smith 1979; Schwartz and Schwartz 1981; Wolff *et al.* 1983; Cranford 1984; Wolff 1985b; Merritt 1987) was used as a representative estimate of home range size.

In summary, food chain model parameters used for the deer mouse were as follows:

Conservative estimates:

Body weight:	0.009 kg
Total ingestion, dry weight:	0.00603 kg/day
Food ingestion, dry weight:	0.005053 kg/day
Water ingestion:	0.00378 L/day

Soil ingestion, dry weight:	0.000977 kg/day
Home Range Size:	0.01 ha

Representative estimates:

Body weights:	0.0185 kg
Total ingestion, dry weight:	0.0035 kg/day
Food ingestion, dry weight:	0.003183 kg/day
Water ingestion:	0.00229 L/day
Soil ingestion , dry weight:	0.000317 kg/day
Home Range Size:	0.19 ha

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1.8 Raccoon: Omnivorous Mammal:

LIFE HISTORY OF THE RACCOON (*Procyon lotor*)

The raccoon is the most abundant and widespread omnivore in North America. Measuring in total length from 60 to 105cm including a 20 to 40 cm tail, raccoons are characterized by a stout body and a black mask across the eyes and cheeks. The body fur is long, fine, thick, and grizzled in appearance. Fur ranges from a dull gray to a medium brown, and the tail is ringed with black and white stripes. The face is whitish, and is framed by a grayish head and white-edged ears. Their long, flexible fingers are opposable to some degree and capable of delicate manipulations (Kaufmann 1982).

Raccoons are mostly nocturnal mammals inhabiting wooded areas near water, marshes, suburban areas, or virtually any place that can provide food, a den, and permanent water (Jones and Birney 1988; Hoffmeister 1989). Their dens are usually within 1,200 feet from a water supply but are situated in an area where the den can remain dry (Hoffmeister 1989). Dens may be in hollow trees, burrows, caves, crevices in rock, haystacks, chimneys, or under logs (Schwartz and Schwartz 1981; Hoffmeister 1989). During periods of heavy snow or ice, raccoons will den together for several days (Schwartz and Schwartz 1981); otherwise, they are normally solitary and remain active throughout the year (Jones and Birney 1988).

Raccoons are opportunistic omnivores, consuming various food items such as berries, fruit, nuts, corn, seeds, aquatic and terrestrial invertebrates, eggs, frogs, snakes, fish, muskrats, and young waterfowl (Schwartz and Schwartz 1981; Jones and Birney 1988). Seasonal and local food availability appears to dictate dietary composition, although as a general rule, plant matter comprises a greater portion of the diet than does animal matter (Barbour and Davis 1974). Animal matter consumption is greatest during spring, with crayfish being the most important food item (Kaufmann 1982).

Males may mate with several females during the breeding season. Breeding may occur from December through July, although most breeding occurs from January to March (Schwartz and Schwartz 1981; Jones and Birney 1988). About 40% of females breed the spring following their birth; the remainder do not breed until their second year. Males are capable of breeding the spring following their birth, but probably have little opportunity (Schwartz and Schwartz 1981). Gestation lasts for approximately 63 days with litter sizes ranging from two to seven young, the usual number being four (Jackson 1961; Barbour and Davis 1974). The young are weaned at 10 to 12 weeks, forage with the mother well into the autumn, and are ready to breed their first winter (Barbour and Davis 1974).

Raccoons maintain fairly well-defined areas of activity (home ranges), but they do not actively defend territories (Stuewer 1943). Although they are solitary animals, raccoons (male, breeding female, and non-breeding female) will utilize areas that are also used at times by other raccoons (their activity ranges may overlap; Stuewer 1943). Because they are omnivorous, raccoons are not as mobile as similar-sized carnivores. When food supplies and other habitat requirements are optimum, raccoons tend to have smaller home ranges than when such environmental factors are limited (Baker 1983). Males generally have larger home ranges than females.

Natural predators of the raccoon include owls, hawks, bobcats, and coyotes (Schwartz and Schwartz 1981; Merritt 1987). Hunting and trapping by humans is a major source of mortality (Jackson 1961). Starvation and malnutrition can be a factor in late winter and early spring, especially for juveniles. Raccoons are susceptible to several diseases, including dog distemper, rabies, and raccoon encephalitis. Most raccoons live less than 5 years in the wild, but may live 10 or 12 years. Raccoons in captivity have lived up to 17 years (Jackson 1961; Schwartz and Schwartz 1981).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range) values found in the literature. Representative exposure parameters are the average of the values located for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day, which usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult body weights vary with location, age, and sex. Males are generally 10% larger than females (Baker 1983), and northern raccoons are generally larger than southern raccoons (Kaufmann 1982). Body weights of yearlings may overlap with adult body weights (Scheffer 1950). Body weights of adult raccoons range from 2.2 to 15 kg (Stuewer 1943; Scheffer 1950; Schoonover 1950; Cabalka *et al*. 1953; Marshall 1956; Kinard 1964; Wood and Odum 1964; Barbour and Davis 1974; Alexander 1977; Lehman 1977; Hardin 1978; Sealander 1979; McComb 1981; Sanderson and Hubert 1981; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Baker 1983; Moore 1983; Merritt 1987; Jones and Birney 1988). A conservative BW of 2.2 kg and a representative BW of 6.55 kg were used in this risk assessment.

The raccoon is an opportunistic feeder; seasonal and local food availability determines dietary composition. Based on review of numerous food habit studies (Hamilton 1936; Giles 1939; Giles 1940; Hamilton 1940; Stuewer 1943; Yeager and Rennels 1943; Baker *et al*. 1945; Yeager and Elder 1945; Schoonover 1950; Tyson 1950; Hamilton 1951; Schoonover and Marshall 1951; Llewellyn and Uhler 1952; Cabalka *et al*. 1953; Tester 1953; Korschgen 1952; Dearborn 1932; Dorney 1954; Wood 1954; Stains 1956; Johnson 1970; Cowan 1973; Alexander 1977; McComb 1981; Mumford and Whitaker 1982; Tabatabai and Kennedy 1988), the average year round diet of the raccoon is comprised of 61% plant foods and 35% animal foods[2]. The percentage of the diet comprised of plant food was higher every season except spring, when 38% of the diet was made up of plant foods and 57% was comprised of animal foods. Corn and fruit were the most important plant food items, and crayfish was the most important animal food item. For this risk assessment, the raccoon will be considered an omnivore that consumes a diet comprised of 61% plant matter and 39% invertebrates.

Food ingestion rates ranging from 271 to 400 g/day have been reported for captive raccoons (Teubner and Barrett 1983; Conover 1989). A conservative food ingestion rate of 400 g/day and a representative food

[2]Dietary composition numbers do not add up to 100%. Several studies reviewed did not report dietary composition numbers that added up to 100%.

ingestion rate of 362 g/day were calculated. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value of 0.38, calculated based on the dietary composition of the raccoon and the water contents of various wildlife foods, presented in U.S. EPA (1993) and Suslow and Cantwell (2003). A conservative food ingestion rate of 0.152 kg/day dry weight and a representative food ingestion rate of 0.138 kg/day dry weight were used in this risk assessment.

A species specific water ingestion rate could not be located for the raccoon. Water ingestion rates were calculated using the allometric equation developed by (Calder and Braun 1983): WI (L/day) = 0.099 $Wt^{0.90}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.201 L/day and a representative water ingestion rate of 0.537 L/day were calculated.

Soil ingestion rates ranging from 0.2 to 9.4 percent of the total diet have been reported for this species (Yeager and Elder 1945; Schoonover 1950; Cowan 1973; Beyer *et al*. 1994). A conservative soil/sediment ingestion rate of 9.4% and a representative soil ingestion rate of 3.4% was used. To calculate soil ingestion rates in units of g/day (dry weight), the soil ingestion estimates were multiplied by the conservative and representative dry weight food intake rates (0.152 and 0.138 kg/day, respectively). This yielded conservative and representative soil ingestion rates of 14.3 g/day and 4.69 g/day (dry weight), respectively.

Home range sizes ranging from 4.71 to 814.6 ha have been reported for adult raccoons (Stuewer 1943; Schoonover 1950; Ellis 1964; Urban 1970; Cowan 1973; Lehman 1977; Sherfy and Chapman 1980; Moore 1983). Males generally have larger home ranges than females. Home range size is also affected by habitat quality; in good habitat, home ranges tend to be smaller. A conservative home range size of 4.71 ha and a representative home range size of 133.3 ha were used for this risk assessment.

In summary, food chain model parameters used for the raccoon were as follows:

Conservative Scenario:

Body weight:	2.2 kg
Total ingestion, dry weight:	0.152 kg/day
Food ingestion, dry weight:	0.1377 kg/day
Water ingestion:	0.201 L/day
Soil ingestion, dry weight:	0.0143 kg/day
Home range:	4.71 ha

Representative Scenario:

Body weight:	6.55 kg
Total ingestion, dry weight:	0.138 kg/day
Food ingestion, dry weight:	0.13331 kg/day
Water ingestion:	0.537 L/day
Soil ingestion, dry weight:	0.00469 kg/day
Home range:	133.3 ha

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1.9 Mink: Piscivorous Mammal

LIFE HISTORY OF THE MINK (*Mustela vison*)

Mink are distributed over much of boreal North America, southward throughout the eastern United States and in the west to California, New Mexico, and Texas (Jones and Birney 1988). They can be found in virtually any habitat containing permanent water; they are not commonly found in upland areas (Jones and Birney 1988). Although primarily nocturnal, their activity often extends into midday (Hoffmeister 1989).

Mink are characterized by dark chestnut brown fur with tails comprising one-third to one-half of their 46 to 70 cm length. The coat is thick and dense, with an oily underfur overlaid by long and coarse guard hairs. Males of the species are up to twice the weight of females. A long neck and thin body are supported by short sturdy legs. An occasional white spot appears on the undersides of the animals, and the ears are short and rounded, lying close to the head. The feet have five webbed toes used for swimming and capturing fish, and anal scent glands are well-developed (Godin 1977; Linscombe *et al.* 1982).

Dens are always near water, usually either in an old muskrat burrow or constructed by the mink itself (Jones and Birney 1988). Males tend to live in their own burrows that are less elaborate than ones occupied by females (Barbour and Davis 1974). The mink is a constant wanderer, and home ranges tend to be linear since mink often follow a shoreline (Jones and Birney 1988). Mink are solitary and mark their territories by spraying (Merritt 1987).

Seasonal food availability governs the mink dietary composition (Barbour and Davis 1974). Their diets may consist of crayfish, muskrats, frogs, fish, snakes, rodents, rabbits, and plants, among other items (Jones and Birney 1988; Schwartz and Schwartz 1981). Crayfish and muskrats are a major portion of the summer diet in many regions of North America (Barbour and Davis 1974; Jones and Birney 1988; Merritt 1987). Larger prey are killed by being bitten on the neck. Females have a difficult time handling larger prey such as muskrats, and their diet is usually more limited.

Breeding occurs from January to early April with gestation periods ranging from 40 to 75 days (Merritt 1987; Schwartz and Schwartz 1981). A single litter highly variable in size (consisting of from 1 to 17 young) may be produced (Schwartz and Schwartz 1981). Average litter sizes vary among regions (Barbour and Davis 1974; Hoffmeister 1989; Jones and Birney 1988; Merritt 1987; Schwartz and Schwartz 1981). Young are weaned at about five to six weeks of age, leave the nest at six to eight weeks, and are sexually mature by ten months (Merritt 1987; Schwartz and Schwartz 1981).

The mink has several predators. Great horned owls, foxes, coyotes, bobcats, and dogs are known to prey on mink (Merritt 1987; Schwartz and Schwartz 1981). There have been records of some mink individuals living up to six years, but mink seldom exceed two years of age in the wild (Schwartz and Schwartz 1981).

Exposure Profile

For the purpose of this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

The mink was selected as a surrogate to model the effects of contaminants on a mammalian piscivore. It is recognized that mink may not actually occur within the study area, however the site is well within the recorded range for mink, and mink are known to use similar habitat for feeding (Linscombe *et al.* 1982).

Adult mink weigh from 500 to 1,734 g (Mitchell 1961; Barbour and Davis 1974; Alexander 1977; Godin 1977; Rue 1981; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Baker 1983; Hornshaw *et al.* 1983; Merritt 1987; Jones and Birney 1988). The lowest BW of 500 g was used for the conservative exposure profile. For the representative scenario, the average BW (955 g) was used.

Mink are opportunistic predators that hunt principally along shorelines and emergent vegetation (U.S. EPA 1993). Seasonal availability and regional preferences govern the primary constituents of the mink's diet. Mammals and crayfish are usually the most abundant prey items, but fish, amphibians, and young birds are also taken (Merritt 1987, Linscombe *et al.* 1982). Overall, the dietary composition of the mink consists of 52% fish, 38% small mammals and birds, 5% crustaceans, 2% amphibians, 0.5% insects, 0.5% vegetation, and 3% other or unidentified matter (Korschgen 1952; Alexander 1977; Rue 1981). For this risk assessment, mink will be assumed to be 100% piscivorous.

Food ingestion rates have been measured in several studies (Bleavins and Aulerich 1981; Aulerich *et al.* 1986; Heaton *et al.* 1995). Reported food ingestion rates range from 131 to 409 g/day. A conservative food ingestion rate of 409 g/day and a representative food ingestion rate of 238 g/day were used for this risk assessment.

A water ingestion rate of 0.133 mL/g BW/day was reported for adult female farm-raised mink (Farrel and Wood 1968). A conservative and representative water ingestion rate of 66.5 mL or 0.0665 L/day and 127 mL or 0.127 L/day were calculated by multiplying the water ingestion rate and the conservative and representative body weights (500 and 955 g, respectively).

An incidental sediment ingestion rate for the mink was not located in the literature; therefore, a predicted incidental ingestion rate for sediment that may be entrained in the digestive system of prey items will be used for this risk assessment. Fish are one of the primary food sources for the mink; consumption of prey items containing sediment is assumed to be the primary mechanism by which a piscivorous mammal such as the mink would ingest sediment. In this model, the bluegill (*Lepomis machrochirus*) will be used to represent fish eaten by the mink.

Bluegills commonly reach a size of 12 ounces (Pflieger 1975). From this, the amount of sediment entrained in fish 12 ounces (340 g) in weight was predicted. A study evaluating the stomach contents of 153 bluegills reported an average content of detritus and sediment to be 9.6 percent of the total diet (Kolehmainen 1974).

A daily food ingestion rate of 1.75 percent of the BW per day has been reported for the bluegill (Kolehmainen 1974). This provides a predicted intake rate of 5.95 g of food per day for a 340 g fish. If a conservative assumption is made that 9.6 percent of the food ingested is entirely sediment, it can be predicted that a fish of this size would contain about 0.5712 g of sediment in its digestive system. For the purpose of this model, it was assumed that the level of sediment contained in the digestive system of a fish remains constant over time. This value (0.5712 g) was divided by the predicted fish BW (340 g) to express sediment entrained in fish digestive systems in units of grams of sediment per gram of fish BW, providing a value of 0.00168 g sediment/g fish BW. Because the dietary composition of the bluegill was reported on a wet weight basis, the sediment content in the digestive tract cannot be converted to a dry weight measure without knowing the moisture content of the sediment ingested. Therefore, to calculate sediment ingestion rates for the mink in units of g/day, the amount of sediment eaten per gram fish BW was multiplied by the conservative and representative wet matter food ingestion rates for the mink to obtain sediment intake rates of 0.687 g/day and 0.4 g/day (wet weight), respectively. Inputting wet weight soil ingestion rates into the exposure models will result in more conservative (i.e., higher) estimates of risk.

Reported home range sizes vary from 7.8 to 770 ha (Mitchell 1961; Arnold and Fritzell 1987; Merritt 1987; Nowak 1991). A home range of 7.8 ha was used as the conservative estimate for home range size, and an average value of 137 ha was used as the representative home range size in this risk assessment (Merritt 1987).

In summary, food chain model parameters used for the mink were as follows:

Conservative estimates:

Body weight:	0.5 kg
Total ingestion:	0.409 kg/day
Food ingestion:	0.408313 kg/day
Water ingestion:	0.0665 L/day
Sediment ingestion:	0.000687 kg/day
Home range size:	7.8 ha

Representative estimates:

Body weight:	0.955 kg
Total ingestion:	0.238 kg/day
Food ingestion:	0.2376 kg/day
Water ingestion:	0.127 L/day
Sediment ingestion:	0.0004 kg/day
Home range size:	137 ha

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2.0 AVIAN COMMUNITY

2.1 Cliff Swallow: Insectivorous Bird

LIFE HISTORY OF THE CLIFF SWALLOW (*Petrochelidon pyrrhonota*)

The cliff swallow is a sparrow-sized, relatively square-tailed swallow with steel-blue upperparts, buff underparts, a dark throat patch, and a characteristic rust or buff colored rump. Its breeding range extends from Mexico to Alaska, covering most of the United States except for the southeast, although it appears to be expanding into the southeastern U.S. as well (Dopson and Peake 1967; Grant and Quay 1977; Gorenzel and Salmon 1994). Suitable breeding habitat is contingent upon proximity to the following: 1) open habitat for foraging; 2) a suitable surface (including an overhang or ledge) for nest attachment, usually on a cliff, concrete wall, or building; 3) mud of the proper consistency for building nests; and 4) fresh water for drinking (Emlen 1941; Grinnell and Miller 1944; Emlen 1954). During migration, cliff swallows are commonly found near lake shores and marshes (Bull and Farrand 1977). Cliff swallow populations have declined following the introduction of house sparrows, which parasitize swallow nests and may cause the birds to desert a colony (Bull and Farrand 1977).

The cliff swallow's diet consists almost entirely (>99%) of animal matter, most of which is comprised of insects, especially bees and wasps, true bugs, beetles, and flies (Beal 1907; Beal 1918). It catches its food on the wing while flying over water or open fields (Schwalbe 1992).

Cliff swallows nest in colonies, the largest of which may contain thousands of nests spaced only inches apart. Individuals tend to show fidelity to previous nesting grounds (Mayhew 1958; Gorenzel and Salmon 1994). Though cliffs traditionally provided the main nesting areas, dams, barns, and even city buildings have served as substrates for nest construction in more recent times (Bent 1942). Nests are built of mud or clay, usually in the shape of a gourd, with a narrow entrance leading to a larger chamber lined with a few stems of grass, feathers, or sticks. Because nests crumble easily, they are built under eaves or ledges that protect them from rain and water runoff. Old nests are re-used repeatedly, though not usually by their previous occupants (Emlen 1954; Mayhew 1958). In more southerly parts of the breeding range, eggs are laid beginning in March, while northern breeders may not begin laying eggs until mid-June (Gorenzel and Salmon 1994). Pairs may raise two broods during a single breeding season (Bent 1942; Grant and Quay 1977; Harrison 1978), and birds will renest if the first clutch is destroyed (Gorenzel and Salmon 1994). One egg is laid per day until the clutch size numbers two to six, with clutches of four or five eggs being most common (Grant and Quay 1977; Harrison 1978; Chapman and George 1991; Gorenzel and Salmon 1994). Eggs are white or off-white with variable numbers and shades of spots or blotches (Bent 1942). The eggs hatch after 12 to 16 days (average 13-15); brood size is usually 2-3 (Grant and Quay 1977; Chapman and George 1991). Young are tended by both parents and fledge about 20 to 25 days post-hatching. Juveniles leave the nest approximately a week later and join other flocks (Gorenzel and Salmon 1994).

Cliff swallows migrate to South America for the winter. They travel in flocks, often in combination with barn and tree swallows, during daylight hours. Their northward progress during the spring is dependent upon sufficient numbers of insects being available to feed upon (Bent 1942; Mayhew 1958). Generally, cliff swallows arrive earlier at nesting sites in the western U.S. than in the eastern U.S., as a result of eastern birds having to circumvent the Gulf of Mexico. They usually arrive in the south, southwestern, and western U.S. beginning in late March, and in the northeastern U.S. around May (Bent 1942). Previous residents tend to arrive at nesting sites first, followed by adults that bred in other locations, and finally by young birds breeding for the first time (Gorenzel and Salmon 1994). After the breeding season, birds may congregate in groups numbering in the thousands before dispersing into smaller groups for the fall migration, which usually occurs between September and October (Bent 1942).

Few species prey upon cliff swallows, although nests built on buildings such as barns are subject to predation by cats (Gorenzel and Salmon 1994). Eggs are occasionally eaten by snakes, and may be destroyed by English sparrows that appropriate swallow nests (Bent 1942, Schwalbe 1992). In some locations, ants may kill nestlings (Bent 1942). Because of the close proximity of large numbers of cliff swallow nests, parasites are a major threat to nestling survival. If parasite infestations become too severe, nests or even entire colonies may be abandoned (Gorenzel and Salmon 1994). Annual mortality among adults is approximately 50%; few birds appear to live more than 4 or 5 years (Mayhew 1958).

Exposure Profile

Conservative exposure parameters reported here are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult cliff swallows weigh from 17.5 to 26.7 g (Clench and Leberman 1978; Brown and Brown 1998; Collins, unpublished data, as cited by Dunning 1984). The lowest value was used as a conservative estimate of BW; the average value (23.1 g) was used as a representative estimate of BW.

Cliff swallows are nearly entirely insectivorous. Beal (1907, 1918) found their diet to consist of 34% hymenoptera, 27% hemiptera, 23% beetles, 13% diptera, and 3% other animal material (including spiders). Plant matter made up less than 1% of the diet. For this risk assessment, it was assumed that the cliff swallow diet is comprised entirely of insects.

A food ingestion rate for the cliff swallow could not be found in the literature. Food ingestion rates were estimated using the equation for insectivorous birds presented in Nagy (2001): $FI(g/day) = 1.633\ Wt^{0.705}$, where FI is the daily food ingestion rate (fresh matter) and Wt is the BW in grams. Using the above weights, a conservative food ingestion rate of 12.3 g/day and a representative food ingestion rate of 14.9 g/day were calculated.

A water ingestion rate for the cliff swallow could not be found in the literature. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): $WI\ (L/day) = 0.059\ Wt^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.00392 L/day and a representative water ingestion rate of 0.00473 L/day were calculated.

A soil ingestion rate for the cliff swallow could not be found in the literature. Instead, the amount of grit found in the stomachs of comparably-sized tree and barn swallows, which have diets and foraging methods similar to those of cliff swallows, was used to represent soil ingestion by cliff swallows. Barrantine (1980) reported that the mean weight of grit (composed primarily of quartz, granite, shell fragments, basalt, and glass) in the stomachs of nestling barn swallows (presumably ingested initially by adults who then fed the grit to their offspring) was 0.0193 g. Mayoh and Zach (1986) found the stomach contents of adult tree swallows to contain a mean weight of 0.0061 g of grit (comprised mainly of small stones and shell fragments), while the stomach contents of nestling tree swallows contained from 0 to 0.0538 g (mean = 0.0172 g) of grit (composed mainly of sand and shells). The highest measure of grit ingestion (0.0538 g) was used as a conservative estimate of soil ingestion; the average of the means (0.0142 g) was used as a representative estimate of soil ingestion. Because the grit content of swallows was reported on a wet weight basis, grit ingestion rates cannot be converted to dry weight measures without knowing the moisture content of the grit ingested. Inputting wet weight soil ingestion rates into the exposure models will result in more conservative (i.e., higher) estimates of risk.

Home range sizes for the cliff swallow could not be found in the literature. However, Emlen (1954) reported that the foraging areas of cliff swallows at three different colonies extended up to 2, 2.5, and 4 miles away from the nests, and Storer (1927) reported that cliff swallows foraged within a 2 mile radius of the colony. Assuming that the foraging areas extend out from the nests in all directions, the area of circles with the above radiuses can be calculated to range from 3256 ha to 13,019 ha. The lowest value was used as a conservative estimate of home range size; the average (5628 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters for the cliff swallow are as follows:

Conservative estimates:

Body weight:	0.0175 kg/day
Total ingestion:	0.0123 kg/day
Food ingestion:	0.0122462 kg/day
Water ingestion:	0.00392 L/day
Soil ingestion:	0.0000538 kg/day
Home range (territory size per breeding pair):	3256 ha

Representative Scenario:

Body weight:	0.0231 kg/day
Total ingestion:	0.0149 kg/day
Food ingestion:	0.0148858 kg/day
Water ingestion:	0.00473 L/day
Soil ingestion:	0.0000142 kg/day
Home range (territory size per breeding pair):	5628 ha

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2.2 Mallard: Omnivorous Bird

LIFE HISTORY OF THE MALLARD DUCK (*Anas platyrhynchos*)

The mallard duck is a common surface-feeding duck that is widespread throughout most of the United States. They often interbreed with domestic ducks as well as with black ducks (*Anas rubripes*). The males are generally heavier than the females (Bellrose 1976).

Wintering mallards tend to prefer natural wetlands and rivers over reservoirs and farm ponds. The primary habitat requirement for nesting appears to be dense grassy vegetation at least a half a meter high. Nests are usually located within a few miles of water (Bellrose 1976; Duebbert and Lokemoen 1976).

In winter, mallards feed primarily on seeds but also on invertebrates, mast, agricultural grains, and, to a lesser extent, on leaves, buds, stems, rootlets, and tubers. In spring, the females shift from a largely herbivorous diet to primarily invertebrates in order to obtain enough protein for their molt and subsequent egg production. The animal diet continues throughout the summer as females produce new clutches to replace those that have been destroyed. Ducklings also consume aquatic fauna almost exclusively (Chura 1961).

The mallard winters in all four of the waterfowl flyways of North America (Pacific, Central, Mississippi, and Atlantic); the Mississippi flyway contains the highest numbers. They arrive at their wintering grounds in the Mississippi Valley in mid-September through early November and depart for their northern breeding grounds in March. Adult females that breed successfully are likely to return to the same nesting ground the following year. Each pair of mallards uses a home range. The drake usually establishes a territory which he defends (Bellrose 1976).

Mallards prefer upland to marsh habitats for their nest sites. Studies indicate that nests are typically found within 100 miles of water (Bellrose 1976). The female mallard forms a nest bowl, or scrape in old plant litter, or in the moist earth. The hen adds down sparingly to the nest until just prior to completion, when she plucks large amounts of down from her breast to form a fluffy ring (Bellrose 1976). The hen covers her eggs with the down lining when absent from the nest. The hen usually lays one egg per day until the clutch is complete. The eggs are ovate and vary in color from grayish buff to greenish buff (Bent 1923). Incubation occurs for 26 to 30 days with a 28 day average (Girard 1941). As soon as the ducklings are dry, the hen leads them to water.

Nest failure is an important factor affecting mallard populations. Mammalian predation is the main cause of failure, followed by human disturbance. Juvenile survival depends mainly on food and habitat availability. Adult females suffer higher natural mortality rates than males. By fall, there is usually a higher proportion of males compared to females in most populations. Adult mortality rates are also higher in areas with greater hunting pressure. The maximum recorded life span of the mallard is 23 years, 5 months (Clapp *et al.* 1982).

Exposure Profile

Conservative exposure parameters reported here are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult body weights ranging from 0.55 kg to 1.82 kg have been reported for mallards (Nelson and Martin 1953; Bellrose 1976; Palmer 1976; Piccirillo and Quesenberry 1980; Delnicki and Reinecke 1986; Heitmeyer 1988; Heinz *et al.* 1989; Transport Canada 2003). Males are generally larger than females (Nelson and Martin 1953, Palmer 1976). The lowest value (0.55 kg) was used as a conservative estimate of BW; the average value (1.14 kg) was used as a representative estimate of BW.

A dietary composition of 28 to 98.4 percent plants and 1.6 to 72 percent invertebrates has been reported for this species (Martin *et al.* 1951; Swanson *et al.* 1985; Delnicki and Reinecke 1986; Gruehagen and Fredrickson 1990). Animal food can be seasonally important; macroinvertebrates comprised 72 percent (by volume) of the diet of female mallards during egg laying season (Swanson *et al.* 1985). For this risk assessment, it was assumed that a mallard's diet is comprised of 79% vegetation and 21% invertebrates.

Mallards are often used in laboratory studies, and several papers were found that cited food ingestion rates for mallards. Food ingestion rates ranging from 0.091 kg/day to 0.139 kg/day have been reported for this species (Davison and Sell 1974; White and Dieter 1978; White and Finley 1978; Piccirillo and Quesenberry 1980; Heinz *et al.* 1987). A food ingestion rate of 0.139 kg/day was reported for birds weighing an average of 1.25 kg (Piccirillo and Quesenberry 1980); a similar ingestion rate of 0.13 kg/day was reported for birds weighing an average of 1.23 kg (Davison and Sell 1974). A conservative food ingestion rate of 0.139 kg/day and a representative food ingestion rate of 0.112 kg/day were identified. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value of 0.60, calculated based on the dietary composition of the mallard and the water contents of various wildlife foods, presented in U.S. EPA (1993). A conservative food ingestion rate of 0.0834 kg/day dry weight and a representative food ingestion rate of 0.0.0672 kg/day dry weight were used in this risk assessment.

A species-specific water ingestion rate could not be found for the mallard. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.059 $Wt^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.04 L/day and a representative water ingestion rate of 0.064 L/day were calculated.

Beyer *et al.* (1994) presented a soil ingestion rate for the mallard of 3.3 percent of the dry matter intake. Measures of the acid insoluble ash content in mallard feces presented in Beyer *et al.* (1998) yield soil ingestion estimates (calculated using the formula presented in Beyer *et al.* 1994) ranging from 0 to 53 percent of the dry matter intake (mean = 4.9%). The highest value (53%) was used as a conservative estimate of soil ingestion; the average of the means (4.1%) was used as a representative estimate of soil ingestion. To calculate soil ingestion rates in units of g/day (dry weight), the soil ingestion estimates were multiplied by the conservative and representative dry weight food intake rates (0.0834 and 0.0672 kg/day, respectively). This yielded conservative and representative soil ingestion rates of 0.0442 kg/day and 0.00276 kg/day (dry weight), respectively.

Home range sizes reported for mallards vary from 38.1 ha (94 acres) for a laying female to 1440 ha (3557 acres) for an adult non-laying female in Minnesota (Gilmer *et al.* 1975; Dwyer *et al.* 1979; Kirby *et al.* 1985). A conservative home range size of 38.1 ha and a representative home range size of 401 ha were used.

In summary, food chain model parameters for the mallard are as follows:

Conservative Scenario:

Body weight:	0.55 kg
Total ingestion, dry weight:	0.0834 kg/day
Food ingestion, dry weight:	0.0392 kg/day
Water ingestion:	0.04 L/day
Soil ingestion, dry weight:	0.0442 kg/day
Home Range:	38.1 ha

Representative Scenario:

Body weight:	1.14 kg
Total ingestion, dry weight:	0.0672 kg/day
Food ingestion, dry weight:	0.06444 kg/day
Water ingestion:	0.064 L/day
Soil ingestion, dry weight:	0.00276 kg/day
Home range:	401 ha

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2.3 American Robin: Soil Invertebrate Feeding Bird

LIFE HISTORY OF THE AMERICAN ROBIN (*Turdus migratorius*)

The American robin (*Turdus migratorius*) occurs throughout most of the continental United States and Canada, wintering in the southern half of North America and into Central America (Bull and Farrand 1977; Peterson 1990). Given the increase in open habitat and lawns, the robin's breeding range has expanded in recent times (Collins and Boyaijan 1965; Ehrlich *et al.* 1988). Habitat requirements for breeding robins include access to fresh water, protected nesting sites, and productive foraging areas (Howell 1942; Ehrlich *et al.* 1988). These requirements are commonly met in moist forests, swamps, open woodlands, and other open areas (Bull and Farrand 1977). Non-breeding robins occupy similar habitats, although proximity to fruit bearing trees is of more importance.

Male robins are characterized by a dark grey to black head and back with a bright red to orange breast. Females and juveniles are similar to males in appearance but much duller in coloring, and juveniles have black spots on their breast. The largest of the North American thrushes, both males and female robins grow to 9 to 11 inches long. Robin legs are classified as booted tarsi, a long leg with few scales (Collins and Boyaijan 1965).

The primary foraging technique for robins is to hop along the ground in search of ground-dwelling invertebrates, although they commonly search for insects and fruit in tree branches as well. The robin's diet during the breeding season consists mainly of invertebrates and some fruit, but fruit is the primary food consumed outside of the breeding season. Robins exhibit a low digestive efficiency for fruit, and they often consume more than their own body weight in fruit to meet their metabolic needs (Hazelton *et al.* 1984).

The diet of the American robin consists of seasonally variable proportions of invertebrates (e.g., earthworms, snails, beetles, caterpillars, spiders) and fruit (e.g., dogwood, cherry, sumac, holly, hackberries, and juneberries) (Martin *et al.* 1951; Paszkowski 1982; Wheelwright 1986; Ehrlich *et al.* 1988). The ratio of percent invertebrates to percent fruit in the diet is reported to change from 94:6 in spring (nesting season) to 34:66 in summer to 94:6 in fall (migratory season) to 7:93 in winter (Wheelwright 1986). Year round, the diet of the robin averages 63% fruits and 37% invertebrates (Martin *et al.* 1951; Eiserer 1976; Wheelwright 1988). Robin diets are diverse; analysis of the stomach contents of 1900 robins showed that the birds consumed fruit from more than 50 plant genera and invertebrates from over 100 families (Wheelwright 1986).

Robins typically use the same foraging site for many weeks at a time but join a variety of roosts, usually within 2 kilometers (km) of the foraging area (Morrison and Caccamise 1990). During the breeding periods, male robins establish territories, the size of which is determined by population density. Smaller territories are found where robin densities are high. Most foraging occurs within these territories; however, if food resources are limited, adult robins will leave temporarily to forage elsewhere. Breeding territories are vigorously defended; robins will attack humans, snakes or other enemies to defend its territory or nest, except in more remote locations (Howell 1942; Collins and Boyaijan 1965). Females lay eggs in nests made of mud, grass, and twigs, built 0.9 to 7.5 m above the ground in trees, buildings, or shrubs. Eggs are characteristically bright blue, number from 3 to 6 per clutch, and hatch in 12 to 14 days. Young juveniles leave two weeks after hatching and can live up to ten years in the wild, though most rarely survive past 14 months (Collins and Boyaijan 1965; Cassidy 1990).

Predators that feed on adult robins include cats, dogs, owls, and hawks. Crows, jays, grackles, snakes and squirrels are nest predators, attacking both eggs and nestlings. A robin that survives to adulthood has a life expectancy of 10 years (Eiserer 1976, Wauer 1999).

Exposure Profile

Conservative exposure parameters reported here are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult American robins weigh from 55 to 103 g (Eiserer 1976; Clench and Leberman 1978; Hazelton *et al.* 1984; Skorupa and Hothem 1985; Wauer 1999; Wheelwright 1986; Wheelwright 1988). The lowest value (55 g) was used as a conservative measure of BW; the average value (77.1 g) was used as a representative measure of BW.

The diet of the American robin primarily consists of fruit and invertebrates. Diet varies seasonally, and depends on habitat and time of day (Wheelwright 1988). The year-round diet is comprised of 37% invertebrates and 63% fruits (Martin *et al.* 1951; Eiserer 1976; Wheelwright 1988). For this risk assessment, however, the diet of the American robin was assumed to consist solely of invertebrates, since soil invertebrates (such as earthworms) are likely to contain higher concentrations of site contaminants than fruit. Therefore, using the American robin to represent a soil invertebrate feeding receptor provides a more conservative assessment of risk.

Food ingestion rates (FIR) for adult robins are highly dependent on whether fruits or invertebrate prey are consumed. Several studies were found that reported daily fruit ingestion rates ranging from 57.1 to 107.8 g/day (Hazelton *et al.* 1984; Tobin 1984; Skorupa and Hothem 1985; Levey and Karasov 1989), with the average being 75.3 g/day. If a robin's diet was 100% fruit, a conservative ingestion rate of 107.8 g/day and a representative food ingestion rate of 75.3 g/day would be used. Only one study was found that reported a food ingestion rate for robins feeding on invertebrates; Levey and Karasov (1989) reported an ingestion rate of 24 g/day for robins consuming crickets. Assuming a diet of 63% fruit and 37% invertebrates, robins consume 67.9 g/day fruit and 8.9 g/day invertebrates (total FIR of 76.8 g/day) under a conservative scenario, and 47.4 g/day fruit and 8.9 g/day invertebrates (total FIR of 56.3 g/day) under a representative scenario. For this risk assessment, assuming a diet of 100% invertebrates, an ingestion rate of 24 g/day (wet weight) was identified for both the conservative and representative exposure scenarios. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR value was multiplied by a value of 0.29, calculated based on the dietary composition of the robin and the water contents of various wildlife foods, presented in U.S. EPA (1993). A food ingestion rate of 0.00696 kg/day dry weight was used in this risk assessment.

A species-specific water ingestion rate could not be found for the robin. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.059 Wt $^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.0085 L/day and a representative water ingestion rate of 0.0106 L/day were calculated.

A soil ingestion rate for the American robin could not be found. Therefore, the soil ingestion rate was derived from the value for the American woodcock (Beyer *et al.* 1994). Given that the diets of the woodcock and robin are similar, soil ingestion by the robin can be expected to be 10.4 percent of the dry matter intake. To calculate soil ingestion rates in units of g/day (dry weight), the soil ingestion estimate was multiplied by the dry matter food intake rate (6.96 g/day) yielding a soil ingestion rate of 0.724 g/day (dry weight).

The reported home range size of the American robin ranges from 0.11 ha to 0.42 ha (Howell 1942; Eiserer 1976; Stokes 1979; Pitts 1984; Wauer 1999). The smallest value (0.11 ha) was used as a conservative estimate of home range size; the average value (0.214 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters for the American robin are as follows:

Conservative Scenario:

Body weight:	0.055 kg
Total ingestion, dry weight:	0.00696 kg/day
Food ingestion, dry weight:	0.006236 kg/day
Water ingestion:	0.0085 L/day
Soil ingestion, dry weight:	0.000724 kg/day
Home range:	0.11 ha

Representative Scenario:

Body weight:	0.0771 kg
Total ingestion, dry weight:	0.00696 kg/day
Food ingestion, dry weight:	0.006236 kg/day
Water ingestion:	0.0106 L/day
Soil ingestion, dry weight:	0.000724 kg/day
Home range:	0.214 ha

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2.4 Wilson's Snipe: Soil Invertebrate Feeding Bird

LIFE HISTORY OF WILSON'S SNIPE (*Gallinago delicata*)

Snipe taxonomic classification, particularly with respect to Wilson's snipe and the Common snipe, is historically complex and has changed several times. The American Ornithological Society currently recognizes the common snipe as *Gallinago gallinago,* which has a palearctic distribution and is rarely found in the United States outside of Hawaii, and the Wilson's snipe as *Gallinago delicata*, which occurs throughout much of the continental United States (Banks *et al.* 2002). This life history will follow the AOU's nomenclature. Historically, however, these species were placed in the genus *Capella* for much of the twentieth century (Mueller 1999). Some classifications and studies referred to the Common snipe as *C.* (or *G.) gallinago gallinago* and Wilson's snipe as *C.* (or *G.) gallinago delicata* (e.g. Bent 1927; Tuck 1972; Mueller 1999), while others referred to the Common snipe as *C. gallinago delicata* (e.g., Jirovec 1971; Fogarty *et al.* 1977; Taylor 1978; McKibben and Hoffman 1985). Some authors have applied the vernacular Wilson's snipe to *C. delicata* or Common snipe to *C. gallinago* (e.g., Sperry 1940; Johnson and Ryder 1977; Clapp *et al.* 1982); others have called Wilson's snipe *C. gallinago* (Martin *et al.* 1951; White and Harris 1966). Still other authors have used only common names, making it difficult to determine which species or subspecies is being referred to, or have used multiple common names to describe the same species (e.g. Erickson 1941; Nelson and Martin 1953; Bull and Farrand 1977). Thus, for the purposes of deriving information used in this life history, any study performed on snipe within the range of the species currently designated as Wilson's snipe (*G. delicata*), regardless of the classification used by the author(s) of that study, is considered to have been done on this species.

Wilson's snipe is a small to medium-sized bird with a very long bill and relatively long legs. It is brown with streaks of buff, its coloration providing camouflage in the bog and marsh habitats with which it is associated. When flushed, the snipe exhibits a characteristic erratic, zig-zag flight pattern. Though more common in the northern part of its range, it can be found throughout much of the North American continent, breeding north of California, Indiana and Massachusetts and wintering regularly as far south as South America (Bull and Farrand 1977; Fogarty *et al.* 1977; Johnsgard 1981). Common snipe prefer open, wet areas with sufficient clumps of low vegetation to provide cover, including marshes, swamps, fens, bogs, wet meadows, and tundra (Mueller 1999). Water availability and exposed organic soil are the main factors determining the snipe's range (Tuck 1972; Arnold 1994).

Wilson's snipe feed by probing in soft mud or silt with their long, sensitive, pliable bill, swallowing most of their food without removing their bill from the substrate. Animal matter, including insects (especially larvae), earthworms, crustaceans, and molluscs, comprises about 85% of the snipe's diet (Sperry 1940; Martin *et al.* 1951; Tuck 1972). The remainder consists mainly of the seeds of rushes and sedges.

The breeding season of the Wilson's snipe begins in April and continues through August, with most of the late nesters being yearlings (Tuck 1972; Harrison 1978). The courtship display consists of males utilizing a technique variously termed "bleating" or "winnowing", in which a loud humming sound is produced by the passage of air through the birds' tail feathers during a series of aerial dives (Bent 1927; Tuck 1972; Johnsgard 1981; Mueller 1999). Early in the breeding season, females are promiscuous, but they eventually build and share a nest with a single mate (Tuck 1972). Breeding territories are maintained by bleating and "yakking", a display performed by both sexes (Tuck 1972; McKibben and Hoffman 1985). Nests consist of shallow depressions in dry ground that are lined with grass or moss (Ehrlich *et al.* 1988). The clutch size is usually four. The brown spotted eggs hatch after about a three week incubation period. Both parents care for the chicks, which begin to fly at about two to three weeks of age. Generally only one brood will be produced in a season (Tuck 1972). Young first breed at about 1 year of age (Tuck 1972).

The Wilson's snipe is a migratory species, with many birds breeding in northern North America and wintering in southern North America or even as far south as South America, though some spend winters as far north as where unfrozen marshes are found (Bent 1927; Tuck 1972; Mueller 1999). Depending upon location, spring migration usually commences between March and April; fall migration generally occurs between August and November (Bent 1927; Tuck 1972; Johnson and Ryder 1977; Taylor 1978; McKibben and Hoffman 1985). Snipe display a high degree of fidelity to their wintering and breeding grounds from year to year (Tuck 1972; Arnold 1981; McKibben and Hoffman 1985).

The main predators of Wilson's snipe are raptors and owls; mammalian predators are rare but include dogs and cats (Bent 1937; Bent 1938; Tuck 1972). Being a game species, the Wilson's snipe also suffers some mortality due to hunting, and snipe eggs are sometimes trampled by livestock (Tuck 1972). The life expectancy at one year is 1.5 years; potential lifespan is about 9 years (Tuck 1972; Clapp *et al.* 1982).

Exposure Profile

Conservative exposure parameters reported here are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult Wilson's snipe weigh from 70 to 171 g (Erickson 1941; Nelson and Martin 1953; Tuck 1972; Clench and Leberman 1978; Arnold 1994; Hebert 2002). The lowest value (70 g) was used as a conservative estimate of BW; the average value (106.4 g) was used as a representative estimate of BW.

The diet of Wilson's snipe consists primarily of animal matter, including 57% insects (especially larvae), 13% molluscs, 9% crustaceans, 3% earthworms, and 4% other animal material; seeds make up about 15% percent of the diet (Sperry 1940; White and Harris 1966; Jirovec 1971; Tuck 1972). Considerable amounts of plant fibers and grit have been found in the digestive tract as well, but these items are not included in estimates of dietary composition because they are believed to be consumed inadvertently through being entrained in the digestive tracts of prey items (e.g. plant material in insects and sediment in earthworms), or as a result of foraging method (e.g., sediment is ingested while probing for prey in mud and plant material is ingested while probing for insects in cow dung; White and Harris 1966). Grit and plant fibers may also be ingested intentionally to help form and cast pellets (Mueller 1999), which are regurgitated five to six hours after feeding (Tuck 1972). In addition to grit and plant fibers, pellets disgorged by Wilson's snipe contain chitin, seeds, mollusc fragments, and other materials, such as sawdust (Tuck 1972). For this risk assessment, it was assumed that the diet of Wilson's snipe is composed entirely of invertebrates.

A food ingestion rate for adult Wilson's snipes could not be found in the literature. Captive juvenile snipes, which can approach adult weight at about three weeks of age, consumed an average of 31.8 g of food in a one day period when 40-42 days of age (Tuck 1972). This value was used as both a representative and a conservative estimate of food ingestion.

Wilson's snipe has been described as a heavy drinker (Ehrlich 1988; Tuck 1972), though a measured water ingestion rate could not be found in the literature. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.059 Wt $^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.0099 L/day and a representative water ingestion rate of 0.0131 L/day were calculated.

A soil ingestion rate for Wilson's snipe could not be found in the literature. Instead, the grit intake rate, reported as percent volume of stomach contents, was used to represent soil ingestion. Grit, usually composed of hard mineral fragments but sometimes including shell fragments, has been found to make up from 10 to 26% of the stomach contents of Wilson's snipes (White and Harris 1966; Tuck 1972). The highest rate of grit ingestion (26%) was used as a conservative estimate of soil ingestion; the average grit ingestion rate (15.6%) was used as a representative estimate of soil ingestion. Because the dietary composition of Wilson's snipe was reported on a wet weight basis, grit ingestion rates cannot be converted to dry weight measures without knowing the moisture content of the grit ingested. Therefore, to calculate soil ingestion rates for Wilson's snipe in units of g/day, the grit ingestion estimates were multiplied by the wet matter food ingestion rate to obtain soil intake rates of 8.27 g/day and 4.96 g/day (wet weight), respectively. Inputting wet weight soil ingestion rates into the exposure models will result in more conservative (i.e., higher) estimates of risk.

Estimates of home range size for Wilson's snipe could not be found in the literature. However, snipe temporarily develop exclusive breeding territories that are defended by displays termed "bleating" and "yakking" (Tuck 1972; Fogarty *et al.* 1977; McKibben and Hoffman 1985). Because territories are (temporarily) exclusive, breeding densities can be used to calculate home range size, although it should be noted that actual territory sizes may be smaller because some habitat may not be utilized, and home range sizes are likely to be larger than territory sizes because not all feeding is done within a territory (Tuck 1972). Estimates of breeding territory size range from 0.95 to 27.8 ha (Tuck 1972; Fogarty *et al.* 1977; Johnson and Ryder 1977; Taylor 1978; McKibben and Hoffman 1985). The lowest value (0.95 ha) was used as a conservative estimate of home range size; the average value (7.29 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters for the Wilson's snipe are as follows:

Conservative estimates:

Body weight:	0.07 kg
Total ingestion:	0.0318 kg/day
Food ingestion:	0.02353 kg/day
Water ingestion:	0.0099 L/day

Soil ingestion:	0.00827 kg/day
Home range (territory size per breeding pair):	0.95 ha

Representative Scenario:

Body weight:	0.1064 kg
Total ingestion:	0.0318 kg/day
Food ingestion:	0.02684 kg/day
Water ingestion:	0.0131 L/day
Soil ingestion:	0.00496 kg/day
Home range (territory size per breeding pair):	7.29 ha

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2.5 American Kestrel: Carnivorous Bird

LIFE HISTORY OF THE AMERICAN KESTREL (*Falco sparverius*)

The American kestrel, once called the sparrow hawk, is the smallest falcon in North America, and very common to the midwestern U.S. It is a jay-sized bird, 9 to 10 inches long with 21 inch wingspan. As with all members of the genus Falco, kestrels have a dark eye, notched beak, and unfeathered legs. Males have a rusty back and tail, blue wings, and a black terminal band on the tail (The Raptor Center 1998). Females are nearly all rusty in color. Both sexes have prominent black barring, a dark vertical line running through the eye, and white cheek and chin patches. The top of the head on both sexes is blue with a rusty cap (The Raptor Center 1998).

The wide distribution of the American kestrel is exemplified in their breeding range, which extends as far north as Alaska and south into central Mexico. They breed locally in Central America and are distributed widely in South America. Most of the Canadian and northern United States kestrels migrate south in the winter, however some males may stay year round. The American kestrel can be found in many different habitats including parks, suburbs, open fields, forest edges, alpine zones, and deserts (The Raptor Center 1998).

Kestrels are often seen hunting in open country and along roadways, typically hovering over one spot (Delaware Valley Raptor Center 1999). Kestrels also utilize perches for hunting and their health is dependent upon prey availability. When biomass of insects such as grasshoppers are low (winter into early spring), kestrels will feed primarily on rodents and small birds. During the summer, kestrels will feed on insects, mainly grasshoppers, both in the air and from the ground (Roest 1957).

Kestrels are cavity nesters that do not make their own cavity (The Raptor Center 1999). Therefore, cavity nesting site availability can be a factor controlling the size of local populations. They tend to use woodpecker holes, artificial nest boxes, and small places in buildings. The male and female will pair off in the spring and choose a nest site. At which time, the female will remain near the nest and allow the male to bring food to her (Balgooyen 1976). Four to five eggs will be laid and incubated for about 30 days. The young fledge about a month after hatching. Juvenile kestrels will sometimes remain with the adults for a month or so after fledging (The Raptor Center).

The kestrel does not have a long life expectancy. In the wild, the average life span is a little over one year. However, in captivity, ages of over 10 years have been recorded. Kestrels may fall prey to accidents and other raptors, but its primary enemy is man (Delaware Valley Raptor Center 1999).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rate) or lowest (BW) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult body weights ranging from 103 to 138 g have been reported for the American kestrel (Roest 1957; Craighead and Craighead 1969; Bird and Clark 1983; Gessaman and Haggas 1987). The lowest value (103 g) was used as a conservative estimate of BW; the average reported value (117 g) was used as a representative estimate of BW.

The diet of the kestrel varies depending on the season and habitat. On average, kestrels eat approximately 41% mammals, 38.5% invertebrates, 13% birds, 6% reptiles, and 1.5 % other or unidentified items (Korschgen 1952; Smith and Murphy 1973; Balgooyen 1976; Rudolph 1980; Collopy and Koplin 1983). For this risk assessment the kestrel is considered to be 100% carnivorous.

Several studies were found that reported food ingestion rates for male and female adult kestrels. Food ingestion rates ranging from 18 to 34.2 g/day were reported (Wing and Wing 1939; Craighead and Craighead 1969; Barrett and Mackey 1975; Koplin *et al.* 1980). A conservative food ingestion rate of 0.0342 kg/day and a representative average food ingestion rate of 0.026 kg/day was used in this risk assessment. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value 0.32 (dry matter content of mouse tissue, U.S. EPA 1993). A conservative food ingestion rate of 0.0109 kg/day dry weight and a representative food ingestion rate of 0.0083 kg/day dry weight were used in this risk assessment.

A reported water ingestion rate for the kestrel could not be found in the literature. Instead, the allometric equation developed by Calder and Braun (1983) was used to estimate the water ingestion rate (water ingestion [L/day] = 0.059 Wt $^{0.67}$, where wt is BW in kg). Using the body weights above, the conservative and representative estimates for water ingestion are 0.0128 L/day and 0.014 L/day, respectively.

A soil ingestion rate for the American kestrel could not be found in the literature; therefore, the amount of soil predicted to be entrained in the digestive tract of the white-footed mouse, a common prey species of the kestrel, was used to calculate this value. Reported soil ingestion rates for the white-footed mouse are less than 2% and 16.2% of the dry matter intake (Connor 1993; Beyer *et al.* 1994), averaging 9.05% (using a value of 1.9% to represent a value of <2%). Using conservative and representative dry matter food ingestion rates for the white-footed mouse of 6.56 g and 3.53 g, respectively (Dice 1922; Sealander 1952; Drickamer 1970; Glazier 1985), and assuming soil ingestion can be used to represent the amount of soil entrained in the digestive tract of the white-footed mouse that remains constant over time, a white-footed mouse can be assumed to conservatively contain 1.06 g of soil, and on average to contain 0.319 g of soil (dry weight). To express 1.06 g soil/mouse in units of grams of soil per gram of mouse dry BW, this value was divided by the lowest reported BW of the white-footed mouse (11 g; Schwartz and Schwartz 1981; converted to a dry weight of 3.52 g by multiplying by the dry matter content of mouse tissue [0.32; U.S. EPA 1993]) to yield a conservative value of 0.301 g soil/g BW mouse (dry weight). To express 0.319 g soil/mouse in units of grams of soil per gram of mouse dry BW, this value was divided by the representative BW of the white-footed mouse (21.7 g; Connor 1953; Lindsay 1960; Sealander 1964; Svendsen 1964; Barbour and Davis 1974;

Sealander 1979; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Feldhamer *et al.* 1983; Yahner 1983; Adler and Tamarin 1984; Seagle 1985; Wolff 1985; Merritt 1987; Jones and Birney 1988; Schug *et al.* 1991; Feldhamer *et al.* 1998; Whitaker *et al.* 1998; converted to a dry weight of 6.944 g as described above); to yield a representative value of 0.0459 g soil/g BW mouse (dry weight). These values were then multiplied by the conservative and representative dry matter food ingestion rates for the kestrel (0.0109 and 0.0083 kg/day) to yield estimated soil ingestion rates of 0.00328 kg/day and 0.00038 kg/day (dry weight), respectively.

Home ranges for the kestrel vary from 68 ha to 130 ha (Craighead and Craighead 1969; Smith and Murphy 1973; Balgooyen 1976). The lowest value was used as a conservative estimate of home range size; the average (97.1 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters for the American kestrel are as follows:

Conservative Scenario:

Body weight:	0.103 kg
Total ingestion, dry weight:	0.0109 kg/day
Food ingestion, dry weight:	0.00762 kg/day
Water ingestion:	0.0128 L/day
Soil ingestion, dry weight:	0.00328 kg/day
Home range:	68 ha

Representative Scenario:

Body weight:	0.117 kg
Total ingestion, dry weight:	0.0083 kg/day
Food ingestion, dry weight:	0.00792 kg/day
Water ingestion:	0.014 L/day
Soil ingestion, dry weight:	0.00038 kg/day
Home range:	97.1 ha

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2.6 Great Horned Owl: Carnivorous Bird

LIFE HISTORY OF THE GREAT HORNED OWL (*Bubo virginianus*)

The great horned owl is one of the largest owls, measuring 46 to 63.5 cm in length with a wingspread ranging from 91 to 152 cm. Males and females are similar in appearance, but females are 10 to 20% larger than males (Owlpages). They vary in color from a reddish brown to gray or black and white. In general, they have light brown body plumage covered with darker brown bars, and a white band of feathers on the upper breast. They have large, yellow eyes bordered by an orange or grayish facial disc. The common name is derived from the large tufts of feathers that appear to be horns which are set far apart on top of the head. Their feet are feathered to the ends of the toes, and immature birds resemble the adults (Owlpages).

Great horned owls occur throughout North, Central and South America. They mostly reside year round in their territories, but owls from the far north may move south for the winter (DesertUSA). They are adaptable, and occur in habitats ranging from dense forest, deserts, and plains, to city parks. The owls prefer open areas to dense woodlands, or nest sites close to the forest edge.

Great horned owls mainly hunt at night. They hunt from perches, or by gliding slowly above the ground. Owls have an acute sense of hearing, which is how they locate their prey. Their ears are located on the sides of the head, but are offset. The ear openings are slightly tilted in different directions, and the right ear may be longer and set higher up on the skull. Soft feathers surround the ear openings, and the owl can spread these to make a funnel for sound to enter the ear. By tilting or moving their head until a sound is equal in volume in both ears, an owl can pinpoint the direction and distance of a sound (DesertUSA).

Great horned owls are opportunistic predators. At least 253 prey species have been identified in dietary composition studies (Owlpages). Rabbits and hares are preferred prey; other species taken include owls, grouse, pigeons, crows, waterfowl, small mammals, rabbits, squirrels, skunks, raccoons, porcupines, muskrats, bats, snakes, lizards, frogs, salamanders and large invertebrates. Small prey can be swallowed whole, but larger prey may be torn into pieces. Birds are often plucked before eating, and the legs and wing tips are discarded. Pellets are regurgitated 6 to 10 hours after eating. Pellets are large (7.6 to 10.2 cm long), dark grayish black, and compact (Owlpages).

Nesting season is from January or February through April. Great horned owls do not build their own nests; nests of other birds such as hawks, crows or herons are used, and they may also nest in tree hollows, rocky caves, or abandoned buildings. Generally two or three eggs are laid, but there may be as many as six. Both the male and female incubate the eggs for 26 to 35 days. Both parents feed the young. Young owls start roaming from the nest onto nearby branches at 6 to 7 weeks of age, but are not able to fly well until they are 9 to 10 weeks old (Austing and Holt 1966; Hammerson and Cannings 1996; Axley 2000). Families are loosely associated during summer. Adults remain near their breeding territories year round, while juveniles disperse in the autumn. Territories can be maintained by the same pair for as long as 8 consecutive years (Owlpages). The adults are solitary, and only stay together during the nesting season.

Captive great horned owls can live 29 to 38 years, and wild owls up to 13 years (Eckert 1974). Most mortality is related to humans through shooting, trapping, road kills and electrocutions. The only natural enemies are other great horned owls or large hawks (Owlpages).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult great horned owls weigh from 0.68 to 2.503 kg (Craighead and Craighead 1969; Earhart and Johnson 1970; Duke *et al.* 1973; Eckert 1974; Peterson 1979). Females tend to be heavier than males. The lowest value (0.68 kg) was used as a conservative estimate of BW; the average (1.436 kg) was used as a representative estimate of BW.

Great horned owls are opportunistic predators. They primarily eat small mammals, rabbits and birds, which comprise 44%, 34%, and 17% of the diet, respectively (Peterson 1979; Aigner *et al.* 1994; Marti and Kochert 1996). For this risk assessment, the great horned owl was considered to be 100% carnivorous.

Food ingestion rates (FIR) ranging from 57.5 to 210 g/day have been reported for great horned owls (Fitch 1947; Craighead and Craighead 1969; Marti 1970; Duke *et al.* 1973; Marti 1973; Tabaka *et al.* 1996). A conservative food ingestion rate of 210 g/day and a representative average food ingestion rate of 102.6 g/day was used in this risk assessment. For this risk assessment, soil and tissue data were only available on a dry weight basis. Therefore, food ingestion rates used in the model were also on a dry weight basis. To convert food ingestion to dry weight, the wet weight FIR values were multiplied by a value 0.32 (dry matter content of mouse tissue, U.S. EPA 1993). A conservative food ingestion rate of 0.0672 kg/day dry weight and a representative food ingestion rate of 0.0328 kg/day dry weight were used in this risk assessment.

A species-specific water ingestion rate could not be found for the great horned owl. Duke *et al.* (1973) reported a water requirement of 44 to 53 mL/kgBW/day for this species; however, owls tested were not provided water to drink: all water was obtained from dietary prey items. Water ingestion rates were therefore calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = $0.059\ Wt^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.046 L/day and a representative water ingestion rate of 0.075 L/day were calculated.

A soil ingestion rate for the great horned owl also could not be found in the literature, therefore, the amount of soil predicted to be entrained in the digestive tract of the white-footed mouse, a common prey species of the great horned owl, was used to calculate this value. Reported soil ingestion rates for the white-footed mouse are less than 2% and 16.2% of the dry matter intake (Connor 1993; Beyer *et al.* 1994), averaging 9.05% (using a value of 1.9% to represent a value of <2%). Using conservative and representative dry matter food ingestion rates for the white-footed mouse of 6.56 g and 3.53 g, respectively (Dice 1922; Sealander 1952; Drickamer 1970; Glazier 1985), and assuming soil ingestion can be used to represent the amount of soil entrained in the digestive tract of the white-footed mouse that remains constant over time, a white-footed mouse can be assumed to conservatively contain 1.06 g of soil, and on average to contain 0.319 g of soil. To express 1.06 g soil/mouse in units of grams of soil per gram of mouse dry BW, this value was divided by the lowest reported BW of the white-footed mouse (11 g; Schwartz and Schwartz 1981; converted to a dry weight of 3.52 g by multiplying by the dry matter content of mouse tissue [0.32; U.S. EPA 1993]) to yield a conservative value of 0.301 g soil/g BW mouse (dry weight). To express 0.319 g soil/mouse in units of grams of soil per gram of mouse dry BW, this value was divided by the representative BW of the white-footed mouse (21.7 g; Connor 1953; Lindsay 1960; Sealander 1964; Svendsen 1964; Barbour and Davis 1974; Sealander 1979; Schwartz and Schwartz 1981; Mumford and Whitaker 1982; Feldhamer *et al.* 1983; Yahner 1983; Adler and Tamarin 1984; Seagle 1985; Wolff 1985; Merritt 1987; Jones and Birney 1988; Schug *et al.* 1991; Feldhamer *et al.* 1998; Whitaker *et al.* 1998; converted to a dry weight of 6.944 g as described above) to yield a representative value of 0.0459 g soil/g BW mouse (dry weight). These values were then multiplied by the conservative and representative dry matter food ingestion rates for the great horned owl (0.0672 and 0.0328 kg/day), to yield estimated soil ingestion rates of 0.02023 and 0.00151 kg/day (dry weight), respectively.

The reported home range sizes of the great horned owl vary from 42 ha to 599 ha in size (Peterson 1979; Buck *et al.* 1996). The smallest reported value (42 ha) was used as a conservative estimate of home range size; the average (241 ha) was used as a representative estimate of home range size.

In summary, food chain model parameters for the great horned owl are as follows:

Conservative Scenario:

Body weight:	0.680 kg
Total ingestion, dry weight:	0.0672 kg/day
Food ingestion, dry weight:	0.04697 kg/day
Water ingestion:	0.046 L/day
Soil ingestion, dry weight:	0.02023 kg/day
Home range:	42 ha

Representative Scenario:

Body weight:	1.436 kg
Total ingestion, dry weight:	0.0328 kg/day
Food ingestion, dry weight:	0.03129 kg/day
Water ingestion:	0.075 L/day
Soil ingestion, dry weight:	0.00151 kg/day
Home range:	241 ha

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2.7 Great Blue Heron: Piscivorous Bird

LIFE HISTORY OF THE GREAT BLUE HERON (*Ardea herodias*)

The great blue heron is the largest and most widely distributed American heron, inhabiting lakes, ponds, rivers, marshes and occasionally newly-plowed fields and meadows (Bull and Farrand 1977; Eckert 1987). The great blue heron is migratory in the northernmost portion of its range. Lingering birds usually fall prey to severe weather (Bull and Farrand 1977). Southward migration begins in early October; northward migration begins in March or early April (Eckert 1987). The great blue heron has a blue-grey back with blackish sides and a white and grey striped belly. The head has a white crown, cheeks and throat. A black stripe on the side of the crown merges into a long occipital crest. The bill is yellow and legs are a greenish-brown . The sexes have similar plumage, but females are smaller. With the exception of its breeding season, this species is solitary in its habits (Hancock and Kushlan 1984).

Great blue herons are primarily diurnal, but nocturnal foraging is common in tidal habitats (Hancock and Kushlan 1984). They feed anywhere they can locate prey (terrestrial or aquatic), but they primarily forage in shallow water less than 50 cm deep (Bent 1926; Bayer 1978). The great blue heron typically feeds either by standing motionless in the water waiting for prey, or by searching stealthily with a slow and careful walk. Their primary food item is fish, although frogs, small turtles, crustaceans, mice, voles, shrews, snakes, and ground-nesting birds are also consumed. Great blue herons generally capture fish ranging from 5 to 40 cm in length, although larger fish are occasionally consumed (Kirkpatrick 1940; Willard 1977). Almost without exception, the great blue heron will shake its bill in the water immediately after swallowing prey, perhaps to wash off debris. Although the digestive fluids of the heron are acidic enough to dissolve bone rapidly, an occasional undigested pellet of feathers and fur is regurgitated (Eckert 1987; Butler 1992).

Courtship occurs soon after the spring migration, with copulation usually occurring on the ground. Great blue herons are mostly monogamous, with new mates selected each year (Butler 1992). Colonial nests are placed on the uppermost branches of trees or shrubs. Occasionally a ground nest will be built if a secluded area is available. Successful nesting areas are usually returned to year after year. Three to seven pale greenish-blue eggs are incubated equally by both sexes for about 28 days (Eckert 1987). The chicks fledge at about 2 months of age. Nesting success depends on food supplies, and most nestling loss is due to starvation (Quinney 1982). Heron chicks weigh approximately 50 g at hatching, and will attain about 86% of their adult weight by 45 days of age (Quinney 1982). Fish fed to chicks range in size from 7.8 cm to 22.8 cm (Hoffman 1978). Great blue herons do not reach sexual maturity until 2 years of age (DeGraaf and Yamasaki 2001).

Very few birds or animals will attack an adult great blue heron. Adult mortality due to attempting to swallow large fish, starvation, or entanglement in utility wires has been reported (Terres 1980). Crows, ravens, owls, eagles, gulls, bears and raccoons prey on the eggs and nestlings (Bent 1926; Hancock and Kushlan 1984). Mortality rates are 69% in the first year, decreasing thereafter (Bayer 1978); the maximum recorded lifespan for a great blue heron is 23 years, 3 months (Clapp *et al.* 1982).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult great blue heron body weights range from 2.09 to 3.64 kg (Palmer 1962; Alexander 1977; Hartman 1961; Hoffman 1978; Quinney 1982; Eckert 1987; Schramm *et al*. 1987; Butler 1992; Environment Canada 1998). Males tend to be slightly larger than females. The lowest value (2.09 kg) was used as a conservative estimate of BW in exposure calculations; the average (2.52 kg) was used as a representative estimate of BW.

Great blue herons are opportunistic predators, and will consume whatever prey are available. Fish are the preferred food item for this species. Based on stomach contents, Palmer (1962) reported a diet comprised of 71.6% fish, 8.2% insects, 8.9% crustaceans, 4.3% herptiles, and 4.7% small mammals. Cottam and Uhler (1945) reported a dietary composition of 43% non-game fish, 25% game or commercial fish, 8% insects, 8% crustaceans, 4% herptiles, and 5% small mammals. Kirkpatrick (1940) reported a dietary composition of 92% fish, 1.7% insects, 2% crustaceans, 4% herptiles and 0.3% small mammals delivered to nestlings by adults. Alexander (1977) reported a dietary composition of 94% fish, 1% crustaceans, 3% amphibians, and 1% bird and mammal, percentage by weight of stomach contents. For this risk assessment, it was assumed that great blue herons consume 100% fish.

Food ingestion rates ranging from 0.202 kg/day to 0.343 kg/day have been reported for this species (Powell 1983; Schramm *et al*. 1987; Hoy *et al*. 1989; Littauer 1990; Stickley *et al*. 1995; U.S. Department of Agriculture 1997). A conservative food ingestion rate of 0.343 kg/day and a representative food ingestion rate of 0.301 kg/day was used in this risk assessment.

A species-specific water ingestion rate could not be found for the great blue heron. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.059 $Wt^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.097 L/day and a representative water ingestion rate of 0.109 L/day were calculated.

An incidental sediment ingestion rate for the great blue heron also was not found in the literature; therefore, a predicted incidental ingestion rate for sediment that may be entrained in the digestive system of prey items was used for this risk assessment. Fish are the primary food source for the great blue heron; consumption of prey items containing sediment is assumed to be the primary mechanism by which a piscivorous bird such as the great blue heron would ingest sediment. In this model, the bluegill (*Lepomis machrochirus*) was used to represent fish eaten by the great blue heron.

Bluegills commonly reach a size of 12 ounces (Pflieger 1975). From this, the amount of sediment entrained in fish 12 ounces (340 g) in weight was predicted. A study evaluating the stomach contents of 153 bluegills reported the total diet to contain an average of 9.6 percent detritus and sediment (Kolehmainen 1974). A daily food ingestion rate of 1.75 percent of the BW per day has been reported for the bluegill (Kolehmainen 1974). This provides a predicted intake rate of 5.95 g of food per day for a 340 g fish. If a conservative assumption is made that 9.6 percent of the food ingested is entirely sediment, it can be predicted that a fish of this size may contain 0.5712 g of sediment in its digestive system.

For the purpose of this model, it was assumed that the level of sediment contained in the digestive system of a fish remains constant over time. This value (0.5712 g) was divided by the predicted fish BW (340 g) to express sediment entrained in fish digestive systems in units of grams of sediment per gram of fish BW. This provided a value of 0.00168 g sediment/g BW. Because the dietary composition of the bluegill was reported on a wet weight basis, the sediment content in the digestive tract cannot be converted to a dry weight measure without knowing the moisture content of the sediment ingested. Therefore, to calculate sediment ingestion rates for the great blue heron in units of g/day, the amount of sediment eaten per gram fish BW was multiplied by the conservative and representative wet matter food ingestion rates for the great blue heron to obtain sediment intake rates of 0.576 g/day and 0.506 g/day (wet weight), respectively. Inputting wet weight soil ingestion rates into the exposure models will result in more conservative (i.e., higher) estimates of risk.

Feeding territory sizes have been reported for this species in terms of km shoreline length and area (ha). In addition, foraging distances from nesting colonies have been measured. Foraging distances ranging between 1.8 to 34.1 km from nesting colonies have been reported (Mathisen and Richards 1978; Peifer 1979; Thompson 1978; Dowd and Flake 1985). Dietary exposure to contaminants will occur within a feeding territory; the distance traveled to a feeding territory is not a factor. Therefore, feeding territory sizes as km shoreline length and measured feeding territory areas was considered in this risk assessment. Actively defended foraging areas ranging from 0.129 to 4.1 km of shoreline length have been reported for this species (Bayer 1978; Peifer 1979; Dowd and Flake 1985). Measured mean feeding territory sizes of 0.6 and 8.4 ha were reported by Bayer (1978). A conservative foraging area size of 0.129 km (shoreline length) or 0.6 ha and a representative foraging area size of 1.36 km (shoreline length) or 4.5 ha was used for this risk assessment.

In summary, food chain model parameters for the great blue heron are as follows:

Conservative Scenario:

Body weight:	2.09 kg
Total ingestion:	0.343 kg/day
Food ingestion:	0.342424 kg/day
Water ingestion:	0.097 L/day
Sediment ingestion:	0.000576 kg/day
Home range:	0.6 ha

Representative Scenario:

Body weight:	2.52 kg
Total ingestion:	0.301 kg/day

Food ingestion:	0.300494 kg/day
Water ingestion:	0.109 L/day
Sediment ingestion:	0.000506 kg/day
Home range:	4.5 ha

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2.8 Bald Eagle: Piscivorous Bird

LIFE HISTORY OF THE BALD EAGLE (*Haliaeetus leucocephalus*)

Bald eagles are one of the largest birds in the raptor family. The bald eagle is generally a dark brown color with yellow eyes, bill and talons. The adult bald eagle is easily distinguished from other eagles by the white coloration of head, neck and tail feathers, usually acquired around their fifth year (Brown and Amadon 1968; Burton 1989). The bald eagle ranges throughout North America as far south as southern Florida and the coast of Baja California (Johnsgard 1990). They tend to be restricted to coastal areas, or to areas near lakes and rivers. There is a size difference between the sexes, with females being larger than males. Sizes also vary geographically, with northern bald eagles being larger than those from southern regions (Green 1985).

Generally, bald eagles do not migrate, but birds found in northern areas will migrate away from areas that become completely frozen over in winter. Birds from Florida often show a reverse migration, going north in the midsummer and returning to the south in the autumn or winter (Brown and Amadon 1968; Burton 1989). The typical home range area for nesting bald eagles is 660 ha per nesting pair (Johnsgard 1990).

Bald eagles locate food primarily by sight by observing the area beneath them either when perching or during flight. Bald eagles are primarily carrion feeders but are known to be opportunistic, taking advantage of any available food source. The staple diet of the eagle is dead or dying fish (Palmer 1988). However, the eagles may also catch large numbers of water fowl, especially when the prey are in restricted areas, such as a small patch of open water surrounded by ice (Brown and Amadon 1968). Bald eagles have also been known to prey on small mammals in times of food shortage.

Bald eagle breeding pairs remain together as long as they live (Johnsgard 1990; Palmer 1988). The distance from human disturbance is important for nest selection. Nests are usually built in trees in old growth strands or on rocks where there are no trees. The nests are very large and made of sticks lined with a softer material such as pine needles. Nests are used over many years with new layers of materials added during each breeding season (Green 1985; Johnsgard 1990). The typical bald eagle nest can measure up to 2.4 meters wide and nearly the same depth (O'Gara 1994). Similarly, bald eagle nests are often located in areas where the eagle has a commanding view, such as old growth strands of timber, typically taller than their surroundings (Palmer 1988). The nests are usually built near water, and during the breeding season, eagles require a large area near water. The breeding season varies depending on their location. One to three eggs (usually 2) are laid, and incubated for 5 weeks (Johnsgard 1990; Palmer 1988). Eagles lay one clutch per year, although they may lay a replacement clutch if the initial clutch is lost (Green 1985; Palmer 1988). Eggs are usually white, but sometimes may have a slight blue coloration. The young are able to fly at just over 10 weeks old, but do not achieve the white head and tail feathers until 4 to 5 years of age (Johnsgard 1990; Palmer 1988).

The bald eagle is a federally designated endangered species. High mortality occurred prior to the 1970s due to hunting and egg breakage caused by organochlorine pesticide exposure. Bald eagle numbers have rebounded significantly since 1970 and this species is currently under consideration for being removed from the Endangered Species List.

Eagle mortality is caused by a variety of factors. Factors that contribute to eagle mortality include widespread acid deposition, which affects the food supply, and lead shot (ingestion of which is fatal) in waterfowl carcasses that the eagles feed on as carrion (Green 1985; Palmer 1988). The average life span of a bald eagle is around 15-20 years in the wild (Green 1985).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the averages of values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult eagles may weigh anywhere from 3.63 to 6.4 kg (Chura and Stewart 1967; Brown and Amadon 1968; Snyder and Wiley 1976; Palmer 1988; Gerrard 1992). Females are significantly larger than males, and body size increases with latitude. This weight difference is the basis for the distinction between the northern and southern subspecies. The lowest reported BW of 3.63 kg was used in the conservative model, and the average BW of 4.7 kg was used in the representative model.

Bald eagles are piscivorous, feeding primarily on fish, though they will eat other animal matter (including carrion). The bald eagle often shows preference towards food sources that are readily or most easily attained. The bald eagle generally prefers eating dead or dying prey as opposed to hunting, and also tries to steal food from other species, especially from other eagles, when given the opportunity. The bald eagle diet may vary greatly depending on the availability of prey at each location. In Texas, the bald eagle diet consisted of 30.1% fish, 5.5% mammals, 33.7% birds and 30.7% reptiles (Mabie 1995). In Arizona, however, the bald eagle diet was comprised of 75.5% fish, 14.3% mammals and 10.2% birds (Hunt 2002). Combining data from different regions, the bald eagle diet is comprised of approximately 50% fish, 36% birds, 7% mammals, 5% reptiles, and 2% miscellaneous other foods (Dunstan 1975; McEwan 1980; Fielder 1982; Mabie 1995; Hunt 2002). For the purposes of this risk assessment, the bald eagle was assumed to have a 100% piscivorous diet.

Food ingestion rates estimated for the bald eagle range from 500 to 533 g/day. The highest food ingestion rate (533 g/day) was used as the conservative food ingestion rate, and the average of 517 g/day was used as the representative food ingestion rate (Stalmaster 1980; Craig *et al*. 1988). Almost all prey fed upon by the eagles in the study were fish, although the eagles were seen feeding on deer carrion on one occasion.

A water ingestion rate for bald eagle was not found in the literature. Therefore, the allometric equation developed by Calder and Braun (1983) was used to estimate the water ingestion rate, as follows: Water Ingestion (L/day) = $0.059\ Wt^{0.67}$, where Wt is the weight in kg. A conservative and representative water ingestion rate of 0.140 L/day and 0.166 L/day were calculated using the conservative and representative body weights of 3.63 kg and 4.7 kg, respectively.

An incidental sediment ingestion rate for the bald eagle also was not found in the literature; therefore, a predicted incidental ingestion rate for sediment that may be entrained in the digestive system of prey items was used for this risk assessment. Consumption of prey items was assumed to be the primary mechanism by which a piscivorous bird such as the bald eagle may incidentally ingest sediment. In this model, bluegill was used to represent fish eaten by the bald eagle.

Bluegills commonly reach a size of 12 ounces (Pflieger 1975). A study evaluating the stomach contents of 153 bluegills reported the total diet to contain an average of 9.6 percent detritus and sediment (Kolehmainen 1974). A daily food ingestion rate of 1.75 percent of the BW per day has been reported for the bluegill (Kolehmainen 1974). From this, the amount of food consumed by the bluegill is calculated to be 5.95 g per day. If the assumption is made that 9.6 percent of the food ingested is sediment, it can be predicted that a fish of this size contains 0.5712 g of sediment in its digestive system. This value (0.5712 g) was divided by the predicted fish BW (340 g) to express sediment entrained in fish digestive systems in units of grams of sediment per gram of fish BW, providing a value of 0.00168 g sediment/g BW. Because the dietary composition of the bluegill was reported on a wet weight basis, the sediment content in the digestive tract cannot be converted to a dry weight measure without knowing the moisture content of the sediment ingested. Therefore, to calculate sediment ingestion rates for the bald eagle in units of g/day, the amount of sediment eaten per gram fish BW was multiplied by the conservative and representative wet matter food ingestion rates for the bald eagle to obtain sediment intake rates of 0.895 g/day and 0.869 g/day (wet weight), respectively. Inputting wet weight soil ingestion rates into the exposure models will result in more conservative (i.e., higher) estimates of risk.

Home ranges values for the bald eagle vary from 400 to 6,392 ha (Haywood and Ohmhart 1983; Griffin and Baskett 1985; Gerrard 1992). The lowest value (400 ha) was used as a conservative estimate of home range size. The average home range size (1665 ha) was used as the representative value.

In summary, food chain model parameters for the bald eagle are as follows:

Conservative estimates:

Body weight:	3.63 kg
Total ingestion:	0.533 kg/day
Food ingestion:	0.532105 kg/day
Water ingestion:	0.14 L/day
Sediment ingestion:	0.000895 kg/day
Home range size:	400 ha

Representative estimates:

Body weights	4.7 kg
Total ingestion:	0.517 kg/day
Food ingestion:	0.516131 kg/day
Water ingestion	0.166 L/day
Sediment ingestion:	0.000869 kg/day
Home range size:	1665 ha

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2.9 Song Sparrow: Omnivorous/Herbivorous Bird

LIFE HISTORY OF THE SONG SPARROW (*Melospiza melodia*)

The song sparrow is a medium sized sparrow with a fairly long, rounded tail. The back is brown with dark streaks, and the top of the head is brown with an inconspicuous central light stripe and broader light stripes over the eye. The breast is grayish and heavily streaked, with a central dark spot (Forbush and May 1939).

Song sparrows are widely distributed in North America, with 31 identified subspecies (Ehrlich *et al.* 1988). They are year-round residents in most of the northern and western United States. This species is abundant in the eastern U.S., and locally abundant in the west in moist areas. Favored habitats for this species include overgrown weedy areas, brush piles, and thickets, especially near water. Abandoned pastures, fence rows, second growth woodlands, and suburban habitats are also utilized. Tompa (1964) listed the following basic habitat requirements for song sparrows: proximity to water, dense vegetation, exposed ground under cover for feeding, concealing vegetation for nest sites, and adequate light intensity. Song sparrows are absent only from large expanses of dense forest with a closed canopy (Master 1993).

Song sparrows nest in shrubs or thickets in a variety of habitats, most often in moist or swampy areas. Three or four broods are raised each year, often in the same nest. If a nest is rebuilt, it is often higher than the first nest (Nice 1931; Ehrlich *et al.* 1988). Early nests are usually on the ground, under grass or weeds. Later nests are on the ground to 1 m above the ground, although they can be up to 3.7 m above ground. Nest building requires from five to ten days, with the female doing most of the nest building. Song sparrows lay from 2 to 6 (usually 3 or 4) pale blue to greenish white eggs marked with reddish-brown. The female incubates the eggs for 12 to 14 days, and development is altricial. Both male and female share feeding responsibilities. The young remain in the nest for 7 to 14 days, and can fly well at 17 days of age. When the young are able to fly, the female may immediately begin to deposit eggs for the second brood, leaving the male to care for the first (Nice 1937; Forbush and May 1939; Harrison 1978; Ehrlich *et al.* 1988; Master 1993).

Song sparrows primarily feed on grass and forb seeds, but also eat some berries and invertebrates. Animal material is more important prior to and during the nesting season. In the northeast, smartweed, bristlegrass, ragweed and panicgrass are favored plant species, while pigweed and knotweed are favored in the west. Beetles, grasshoppers, crickets, caterpillars, and ants are the chief animal foods consumed. Plant food comprises 86%, 54%, 60% and 92% of the diet in the winter, spring, summer, and fall, respectively (Martin *et al.* 1951). Judd (1901) described a year-round diet comprised of 66% plant seeds and berries and 34% animal matter. Nestlings are fed exclusively on animal material, with 80% of the food brought to early nestlings being comprised of larval forms of insects (Tompa 1964).

Song sparrows defend a territory that includes mating, nesting and feeding areas (Tompa 1962). Male song sparrows set up territories through late fall and winter, and are highly territorial by late February. Mate selection by females is passive, with the female settling into a territory that contains an unmated male. Territory size and male aggressiveness do not appear to be factors in female mate selection; the presence of dense vegetation that offers good nesting sites is more important (Tompa 1964). Territorial defense is lacking from July to September, when adults molt (Johnston 1956).

Along with the yellow warbler, the song sparrow is one of the most frequent host species of the brown-headed cowbird. Cowbird eggs resemble song sparrow eggs more closely than those of any other host, and sparrows seldom eject cowbird eggs from their nests (Ehrlich *et al.* 1988; Smith and Arcese 1994). Nest parasitism rates ranging from 0 to 46% have been reported for an island population of song sparrows (Smith and Arcese 1994). Nice (1937) reported nest parasitism rates ranging from 26 to 78% for a song sparrow population in Ohio.

Mortality due to predation is high in nestling song sparrows. Johnston (1956) observed 56% mortality of eggs and nestlings in a 3 week period, and 80 to 85% mortality from week 3 to 52. The major causes of mortality were rodent predators, nest desertion and high water levels. Adult mortality rates were 43% per year, mostly due to predation by hawks and owls. Based on banding information, song sparrows in the wild can live up to 7.5 years (Nice 1937).

Exposure Profile

For this risk assessment, conservative exposure parameters are the highest (ingestion rates) or lowest (BW, home range) values found in the literature. Representative exposure parameters are the average of the values found for this species. When an allometric equation is used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equation are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult song sparrow body weights range from 11.4 g to 30 g (Nice 1937; Marshall 1948; Helms 1959; Willson and Harmeson 1973; Clench and Leberman 1978; Rosenberg *et al.* 1982; Smith *et al.* 1986; Environment Canada 1998). Males tend to be heavier than females (Marshall 1948), with average body weights of 22.3 and 21.6 g, respectively. For this risk assessment, a conservative BW of 11.4 g and a representative BW of 21.8 g was used.

Song sparrows primarily eat seeds and berries, but also consume appreciable amounts of invertebrates. The diet consists of approximately 60% plant seeds and berries and 40% animal matter (Judd 1901; Martin *et al.* 1951; Rosenberg *et al.* 1982). Grasshoppers and beetles were the invertebrate groups consumed most often (Judd 1901). For this risk assessment, the song sparrow was modeled both as an omnivore and an herbivore.

A food ingestion rate for the song sparrow could not be found in the literature. Food ingestion rates were estimated using the dry matter intake (DMI) equation for passerine birds presented in Nagy (2001): $FI(g/day)=0.630Wt^{0.683}$, where FI is the daily food ingestion rate (dry weight) and Wt is the BW in grams. These calculations resulted in conservative and representative dry weight food ingestion rates of 3.32 g/day and 5.17 g/day, respectively.

No quantitative water ingestion rates were found for this species. An allometric equation developed by Calder and Braun (1983) was used to estimate the water ingestion rate ($WI\ [L/day] = 0.059\ Wt^{0.67}$, where WI is the water ingestion rate and Wt is BW in kg). Using this equation, a conservative estimate for water ingestion is calculated to be 0.0030 L/day (Wt =11.4 g) and a representative water ingestion rate is 0.0045 L/day (Wt = 21.8 g).

Most of the year, song sparrows forage primarily on the ground. During the nesting season, they may forage for insects in bushes and grass (Tompa 1962; Tompa 1964; Bent 1968). Soil may be ingested along with seeds and insects collected from the ground surface; however, a soil ingestion rate could not be found for the species. Therefore, a soil ingestion rate reported for the bobwhite was used instead. While bobwhites and song sparrows are not closely related, they have similar foraging strategies, eating primarily seeds, which they pick up off the ground, supplemented by insects (U.S. EPA 1993). Wood *et al.* (1986) found that sand and gravel comprised 5.5% and 4.4% (dry weight) of the volume of the crop contents of bobwhites in spring and summer, respectively. The highest value (5.5%) was used as a conservative estimate of soil ingestion; the average of these values (4.95%) was used as a representative estimate of soil ingestion. To calculate soil ingestion in units of g/day (dry weight), these values were multiplied by the respective dry matter food intake rates (3.32 and 5.17 g/day). These calculations yielded conservative and representative soil ingestion rates of 0.182 g/day and 0.256 g/day (dry weight), respectively.

Song sparrows actively defend territories which encompass mating, nesting, and feeding areas. Territory sizes ranging from 0.007 ha to 4.7 ha have been measured for this species (Butts 1927; Nice 1937; Beer *et al*. 1956; Fitch 1958; Suthers 1960; Tompa 1962; Tompa 1964; Knapton and Krebs 1974; DeGraaf 1989). A conservative territory size of 0.007 ha and a representative territory size of 0.39 ha was used for this risk assessment.

In summary, food chain model parameters for the song sparrow are as follows:

Conservative Scenario:

Body weight:	0.0114 kg
Total ingestion, dry weight:	0.00332 kg/day
Food ingestion, dry weight:	0.003138 kg/day
Water ingestion:	0.0030 L/day
Soil ingestion, dry weight:	0.000182 kg/day
Home range:	0.007 ha

Representative Scenario:

Body weight:	0.0218 kg
Total ingestion, dry weight:	0.00517
Food ingestion, dry weight:	0.004914 kg/day
Water ingestion:	0.0045 L/day
Soil ingestion, dry weight:	0.000256 kg/day
Home range:	0.39 ha

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2.10 Spruce Grouse: Herbivorous Bird

LIFE HISTORY OF THE SPRUCE GROUSE (*Dendragapus canadensis*)

Spruce grouse are medium sized, stocky birds that resemble willow ptarmigans in shape and size. Spruce grouse are generally 15-17 inches long, with male grouse being slightly larger than female grouse. Spruce grouse also show sexual dimorphism. Males are generally marked with gray and black, with a black throat and a well-defined black breast patch that is bordered with white-tipped feathers. Their tail is generally brown or blackish in color with a chestnut tip and white-tipped undertail coverts. They also have a finely barred gray and black rump and a crimson comb above each eye (Johnsgard 1973; Boag and Schroeder 1992). The abdomen is mostly blackish, tipped with tawny (laterally) to white markings that become more conspicuous toward the tail. The bare skin above the eyes of males is scarlet red; no bare skin is present on the neck. The female grouse is brown overall with black barring and a chestnut terminal tailband. The spruce grouse can be found in the northernmost sections of the mainland U.S., including northeastern Oregon, central Idaho, western Montana, northwestern Wyoming, Minnesota, Wisconsin, Michigan and New York (Boag and Schroeder 1992). They also occur in central Alaska, Yukon, Mackenzie, northern Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Labrador and Cape Breton Island in northern North America.

Spruce grouse have a fairly restricted habitat; an important component is cover to conceal their presence from potential predators. They prefer early to mid-successional stage coniferous forests of primarily spruce and fir, with an under story of blueberries and other ericaceous plants and scattered openings of a few hundred square feet. Low, wetland areas are preferred as well. In the east, spruce grouse inhabit dense spruce, fir, cedar, and tamarack swamps. They also can be found among hemlocks and other trees, but seldom out in the open. They may also inhabit growths of cedar, black spruce, and hackmatack with occasional wanderings into areas of young balsams and red and white spruces 8 to 10 feet high. In the west, spruce grouse are less dependent on swamps and prefer the higher ground of boreal forests containing black spruce and jack pine. The winter habitat of the spruce grouse usually is within dense stands of jack pine, on which the grouse feed (Johnsgard 1973; Herzog and Boag 1978; Boag and Schroeder 1992).

Spruce grouse nests consist of small depressions in the ground, often placed under low branches, and are lined with grass and down feathers. The nests are usually between 13 to 15 cm in diameter and 2 to 5 cm deep (Herman 1980). Nests are most commonly located at the base of a single tree (usually pine) or between 2 or 3 closely adjoining trees. They can also be found under clumps of willow, mats of juniper or under horizontal logs (Herman 1980). Egg laying by spruce grouse begins about 17 days after the ground becomes 50% snow-free. The number of eggs incubated varies from 4 to 10, with few noted occurrences of renesting (Johnsguard 1973). One egg is laid every 1.5 to 2 days. Incubation lasts around just over 20 days, with recorded incubation periods of 21 days in captivity and 23.5 in the field (McCourt *et al.* 1973). Egg shape is oval to short oval with a tawny or pale tawny olive color with amber to brown spots and blotches. The chicks are precocious and leave the nest immediately after hatching, usually within a 12 hour period (Schroeder and Boag 1985).

The spruce grouse is primarily an herbivorous bird, although it has been known to consume small amounts of animal matter, consisting mostly of arthropods, during the snow free period of the year. Otherwise, they feed primarily on the needles of pine trees. Whenever pine needles are not available, the spruce grouse will feed on the needles of other coniferous trees, such as spruce. When not feeding on conifers, the spruce grouse feed on the ground on the flowers and fruit of small forbs and shrubs (such as blueberry), the fruiting parts of forest fungi, small arthropods, terrestrial snails and grit (Pendergast and Boag 1970; Naylor and Bendell 1989; Defranceschi and Boag 1991; Boag and Schroeder 1992).

Most of the spruce grouse population does not migrate; however, up to 25% of the adult population may undertake annual movements of up to 11 km between wintering and breeding ranges. Grouse that do not migrate apparently breed in or near the area in which they spend their first winter (Boag and Schroeder 1992).

Spruce grouse mortality is caused by a variety of factors. Predation by lynx, fox, and goshawk contribute to mortality; however, most spruce grouse deaths are caused by hunting. The oldest recorded age of the spruce grouse is 13 years, but the average life span is considerably less (Boag and Schroeder 1992).

Exposure Profile

Conservative exposure parameters reported here are the highest (ingestion rates) or lowest (BW, home range size) values found in the literature. Representative exposure parameters are the average of the values found for this species. When equations using body weights are used to calculate ingestion, representative ingestion rates (in units of amount ingested per day) are higher than conservative ingestion rates, since the corresponding body weights input into the equations are higher. However, it should be noted that when these ingestion rates are used in dietary models, they are converted from the total amount ingested per day to the amount ingested per kg BW per day. This usually results in conservative estimates that are higher than representative estimates, on a per unit of BW basis.

Adult spruce grouse may weigh anywhere from 450 to 680 g (Nelson and Martin 1953; Haas 1974; Zwickel and Brigham 1974; Herman 1980). Males are usually heavier than females. The lowest BW of 450 g was used in the conservative model, and the average BW of 515 g was used in the representative model.

Spruce grouse are primarily herbivorous, feeding mainly on the needles of coniferous trees. During summer months they will occasionally eat animal matter (arthropods), blueberry shrubs, and fungus. During the autumn and winter months their diet shifts to 100% conifer needles (Boag and Schroeder 1992). For this risk assessment, the spruce grouse was assumed to be 100% herbivorous.

A food ingestion rate for the spruce grouse could not be found in the literature. Food ingestion rates were estimated using the equation for galliforms presented in Nagy (2001): $FI(g/day)=0.088Wt^{0.891}$, where FI is the daily food ingestion rate (dry weight) and Wt is the BW in grams. The calculated intake rates were 20.3 and 22.9 g/day (dry weight) based on conservative and representative body weights, respectively.

A water ingestion rate for the spruce grouse also could not be found in the literature. Water ingestion rates were calculated using the allometric equation developed by Calder and Braun (1983): WI (L/day) = 0.059 $Wt^{0.67}$, where WI is the daily water ingestion rate and Wt is the BW in kg. Using the above body weights, a conservative water ingestion rate of 0.035 L/day and a representative water ingestion rate of 0.038 L/day were calculated.

A soil ingestion rate could not be found for the spruce grouse. Spruce grouse may forage both in trees and on the ground (Ehrlich *et al*. 1988); soil may be ingested along with pine needles and fruit collected from the ground surface. Additionally, spruce grouse eat grit, which they store in their crops and use as a digestive aid (Gill 1990; Bendell-Young and Bendell 1999). Therefore, the soil ingestion rate of the wild turkey, another gallinaceous species that forages on the ground and uses grit as an aid to digestion, was used to estimate soil ingestion by the spruce grouse. Beyer *et al*. (1994) estimated the soil ingestion rate of the turkey to be 9.3% of the dry matter intake. To calculate soil ingestion rates in units of g/day (dry weight), the soil ingestion estimates were multiplied by the dry matter food intake rates, presented above, yielding conservative and representative soil ingestion rates of 1.89 g/day and 2.13 g/day (dry weight), respectively.

Home ranges for the spruce grouse vary from 2.6 to 35.5 ha (Haas 1974; Herman 1980; Ellison 1973). The lowest value (2.6 ha) was used as the conservative estimate of home range size. The average, 21.9 ha, was used as the representative value.

In summary, food chain model parameters for the spruce grouse are as follows:

Conservative estimates:

Body weight:	0.45 kg
Total ingestion, dry weight:	0.0203 kg/day
Food ingestion, dry weight:	0.01841 kg/day
Water ingestion:	0.035 L/day
Soil ingestion, dry weight:	0.00189 kg/day
Home range:	2.6 ha

Representative Scenario:

Body weight:	0.515 kg
Total ingestion, dry weight:	0.0229 kg/day
Food ingestion, dry weight:	0.02077 kg/day
Water ingestion:	0.038 L/day
Soil ingestion, dry weight:	0.00213 kg/day
Home range:	21.9 ha

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Appendix M - Summary Tables of General Water, Sediment, and Soil Parameters
Midnite Mine Site
Wellpinit, Washington

Table M 1. General Surface Water Quality Parameters for Pit 3
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled								Mean	Standard Deviation
		2/4/00	12/12/99	6/15/99	5/17/99	4/21/99	12/10/98	11/15/98	10/14/98		
Temperature	^oC	4.2	4	21.5	11	12.2	4.1	8.3	10.5	9.475	5.90
pH	SU	4.04	4.38	4.26	4.44	4.13	4.56	4.41	4.45	4.33375	0.18
Dissolved Oxygen	mg/L	10	11.8	7.8	9.7	10.4	10.6	9.6	9	9.8625	1.18
Total Suspended Solids	mg/L	12	U (5)	U (5)	U (5)	U (5)	14	U (5)	U (5)	13	1.41
Hardness	mg/L	2210	2200	2050	1990	2000	2360	2320	2320	2181.25	150.37
Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Bicarbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	3280	2800	2680	2480	2310	3190	2990	2880	2826.25	333.04
Specific Conductance	µS/cm	3710	3440	3420	3130	2870	3720	3770	1470	3191.25	762.28
Total Dissolved Solids	mg/L	4090	3850	3790	3530	3350	4220	4220	4320	3921.25	352.07
Total Cations	mEq/L	65.7	57.9	54.5	52.4	51.7	63.8	63.1	62.3	58.925	5.53
Total Anions	mEq/L	69.1	59.1	56.6	52.2	48.7	67.2	63	60.6	59.5625	7.00
Cation-Anion Balance	ratio	-2.5	-1	-1.9	0.2	3	-2.6	0.1	1.4	-0.4125	1.97
Chloride	mg/L	2	0	2	2	2	4	4	3	2.375	1.30
Ferrous Iron	mg/L	ND	ND	ND	1.11	0.97	ND	ND	1.34	1.14	0.19
Iron	µg/L	2520	160	220	240	220	150	140	170	477.5	826.12
Fluoride	mg/L	1	1.4	5	1.5	1.7	1.8	1.1	1.1	1.825	1.32
Silica	mg/L	27	23.1	30.6	33.1	36.1	27	27	27	28.8625	4.15
Total Inorganic Carbon	mg/L	U (1)	U (1)	U (2)	U (2)	U (2)	51	U (1)	U (1)	51	NC
Nitrate	mg/L	1.28	1.66	1.34	1.08	0.94	2.36	2.35	2.46	1.68375	0.62
Nitrite	mg/L	U (.01)	U (.01)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	1.28	1.66	1.44	1.14	0.99	2.35	2.62	2.1	1.6975	0.60
Phosphorus	mg/L	U (.01)	0.08	U (.01)	0.02	U (.01)	U (.01)	U (.01)	U (.01)	0.05	0.04

^oC = degrees Centigrade
SU = standard units
mg/L = milligrams per liter
µS/cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 2. General Surface Water Quality Parameters for Pit 4
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled								Mean	Standard Deviation
		6/15/99	5/17/99	4/21/99	2/20/99	1/14/99	12/10/98	11/15/98	10/14/98		
Temperature	^oC	20.1	10.7	10.8	3	4.1	2.6	7.8	10.2	8.6625	5.76
pH	SU	6.99	7.43	7	6.92	6.85	7.02	7.1	7.54	7.10625	0.25
Dissolved Oxygen	mg/L	8.4	10.4	10.4	10.5	12.2	12.4	10.8	9.4	10.5625	1.32
Total Suspended Solids	mg/L	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	NC	NC
Hardness	mg/L	238	194	120	310	350	352	363	352	284.875	90.73
Alkalinity	mg/L	35	31	24	41	45	49	49	46	40	9.15
Bicarbonate Alkalinity	mg/L	35	31	24	41	45	49	49	46	40	9.15
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	230	190	110	280	330	320	330	330	265	81.77
Specific Conductance	µS/cm	514	445	269	641	759	750	737	496	576.375	175.48
Total Dissolved Solids	mg/L	390	320	220	480	540	550	540	550	448.75	125.63
Total Cations	mEq/L	5.2	4.2	2.7	6.8	7.7	7.7	8	7.7	6.25	1.98
Total Anions	mEq/L	5.5	4.6	2.9	6.7	7.9	7.7	7.9	7.9	6.3875	1.88
Cation-Anion Balance	ratio	-2.9	-4.5	-2.6	0.6	-1.3	-0.1	0.2	-1.1	-1.4625	1.76
Chloride	mg/L	U (1)	1	2	U (1)	U (1)	U (1)	U (1)	U (1)	1.5	0.71
Ferrous Iron	mg/L	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	NC	NC
Iron	µg/L	U (7)	U (7)	20	60	U (7)	40	60	20	40	20.00
Fluoride	mg/L	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.3125	0.06
Silica	mg/L	21.6	21.2	20.6	20	20.7	21.3	22.2	23	21.325	0.95
Total Inorganic Carbon	mg/L	8	6	6	11	11	11	11	11	9.375	2.33
Nitrate	mg/L	U (.05)	U (.05)	0.05	0.11	U (.05)	U (.05)	U (.05)	U (.05)	0.08	0.04
Nitrite	mg/L	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	U (.02)	U (.02)	0.03	0.11	U (.02)	U (.02)	U (.02)	U (.02)	0.07	0.06
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	0.4	U (.3)	U (.02)	U (.02)	ND	0.4	NC
Phosphorus	mg/L	U (.01)	U (.01)	U (.01)	0.01	U (.01)	U (.01)	U (.01)	U (.01)	0.01	NC

^oC = degrees Centigrade
SU = standard units
mg/L = milligrams per liter
µS/cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 3. General Surface Water Quality Parameters for the Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled													Mean	Standard Deviation
		2/3/00	1/8/00	12/8/99	8/7/99	6/16/99	5/18/99	4/19/99	3/11/99	2/17/99	1/12/99	12/8/98	11/10/98	10/14/98		
Temperature	^{o}C	5.7	3	5.1	23.1	25.8	14.6	13.2	10.5	6.6	3.7	1.7	7	11	10.08	7.50
pH	SU	4.48	4.72	4.49	4.04	3.96	4.22	4.31	4.26	4.36	4.45	4.55	4.54	4.17	4.35	0.22
Dissolved Oxygen	mg/L	11.2	11.1	11.3	6.9	6.5	7.9	9.4	4.6	9.8	10.5	10.7	10.3	7.7	9.07	2.14
Total Suspended Solids	mg/L	6	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	8	U (5)	U (5)	7.00	1.41
Hardness	mg/L	2260	2320	2380	2760	2950	2730	2460	2470	2690	5280	2500	2630	3070	2807.69	780.25
Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Bicarbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	2780	2860	3150	3350	3620	3240	3240	3000	3420	3000	2980	3650	4110	3261.54	371.35
Specific Conductance	µS/cm	3220	3460	3880	4180	4030	3840	3900	3670	4030	4070	3810	993	1628	3439.31	988.08
Total Dissolved Solids	mg/L	3630	3490	4010	4870	5050	4640	4340	4270	4560	4670	4360	5090	5890	4528.46	637.47
Total Cations	mEq/L	53.3	55.6	65.6	72.1	79	72.5	66.7	67.8	71.5	143	68.5	71	87.1	74.90	22.23
Total Anions	mEq/L	58.6	60.3	66.4	70.6	76.2	68.2	68.2	63.1	72	126	62.8	77	86.4	73.52	17.51
Cation-Anion Balance	ratio	-4.7	-4.1	-0.6	1.1	1.8	3	-1.1	3.6	-0.3	6.2	4.3	-4.1	0.4	0.42	3.40
Chloride	mg/L	2	2	U (2)	2	2	2	2	U (1)	2	2	2	3	3	2.18	0.40
Iron	µg/L	90	80	310	360	300	320	410	700	300	480	240	250	490	333.08	165.60
Fluoride	mg/L	1.1	1.1	1.4	1.5	1.6	1.5	1.5	1.7	1.9	1.8	4	5	0.3	1.88	1.25
Silica	mg/L	30.6	33.7	35	39	43.9	47	44	48	42	38	34	33.4	41	39.20	5.62
Total Inorganic Carbon	mg/L	U (1)	U (1)	U (1)	U (1)	U (5)	U (1)	U (1)	U (1)	U (1)	U (1)	1	U (1)	U (1)	1.00	NC
Nitrate	mg/L	1.39	ND	1.2	1.35	1.4	1.41	1.28	1.17	1.45	1.61	1.38	1.52	1.64	1.40	0.14
Nitrite	mg/L	U (.01)	ND	U (.01)	U (.01)	U (.25)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.25)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	1.39	1.46	1.2	1.35	1.51	1.6	1.41	1.3	1.57	1.47	1.4	1.74	1.45	1.45	0.14
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0.7	0.7	0.8	0.5	ND	0.68	0.13
Phosphorus	mg/L	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	0.02	0.02	U (.01)	U (.01)	0.01	U (.01)	0.02	U (.01)	0.02	0.01

^{o}C = degrees Centigrade
SU = standard units
mg/L = milligrams per liter
µS/cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 4. General Surface Water Quality Parameters for the Blood Pool
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date and Sampled					Mean	Standard Deviation
		5/16/99	4/19/99	3/11/99	1/14/99	12/8/98		
Temperature	^oC	16.9	13.7	3.9	2.6	1.5	7.72	7.06
pH	SU	3.5	3.34	3.29	4.88	5.55	4.11	1.04
Dissolved Oxygen	mg/L	8.7	9.9	8.6	12.2	9.9	9.86	1.45
Total Suspended Solids	mg/L	U (5)	30	8	16	10	16.00	9.93
Hardness	mg/L	1700	1490	991	575	1670	1285.20	488.11
Alkalinity	mg/L	U (2)	U (2)	U (2)	2	6	4.00	2.83
Bicarbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	2	6	4.00	2.83
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	2190	2260	1490	630	1620	1638.00	657.62
Specific Conductance	µS/cm	2970	2900	2130	1277	2610	2377.40	698.30
Total Dissolved Solids	mg/L	3380	3030	1980	930	2450	2354.00	960.02
Total Cations	mEq/L	46	43.8	30.2	13.1	34.9	33.60	13.15
Total Anions	mEq/L	46.1	47.6	31.4	13.3	34.2	34.52	13.83
Cation-Anion Balance	ratio	-0.1	-4.1	-1.9	-0.8	1	-1.18	1.94
Chloride	mg/L	2	2	1	1	2	1.60	0.55
Ferrous Iron	mg/L	ND	7.6	6	0.21	0.18	3.50	3.87
Iron	µg/L	1430	8300	17000	360	690	5556.00	7179.74
Fluoride	mg/L	1.3	1.3	1.3	0.6	0.5	1.00	0.41
Silica	mg/L	70.4	59.8	58.9	13.2	27.3	45.92	24.38
Total Inorganic Carbon	mg/L	U (2)	U (1)	3	4	6	4.33	1.53
Nitrate	mg/L	U (.05)	U (.05)	0.13	0.36	1.73	0.74	0.87
Nitrite	mg/L	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	0.5	U (.02)	0.16	0.39	1.14	0.55	0.42
Nitrogen, Kjeldahl	mg/L	U (.5)	U (.5)	U (.5)	U (.5)	0.6	0.60	0.00
Phosphorus	mg/L	U (.01)	0.02	0.02	0.01	U (.01)	0.02	0.01

^oC = degrees Centigrade
SU = standard units
mg/L = milligrams per liter
µS/cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 5. General Surface Water Quality Parameters for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled 4/7/00	Date Sampled 9/27/99	Mean	Standard Deviation
Temperature	^oC	7.29	12.71	10	3.83
pH	SU	6.24	4.48	5.36	1.24
Dissolved Oxygen	mg/L	11.01	3.9	7.455	5.03
Turbidity	NTU	10	0	5	7.07
Total Suspended Solids	mg/L	U (4)	10.5	10.5	NC
Hardness	mg/L	1737	2506	2121.5	543.77
Alkalinity, Total	mg/L	14.2	9	11.6	3.68
Bicarbonate Alkalinity	mg/L	14.2	9	11.6	3.68
Carbonate Alkalinity	mg/L	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	NC	NC
Sulfate	mg/L	1650	2520	2085	615.18
Specific Conductance	µS/cm	2910	3790	3350	622.25
Total Dissolved Solids	mg/L	2670	3800	3235	799.03
Chloride	mg/L	4.29	3.74	4.015	0.39
Eh	mV	302	392	347	63.64
Ferrous Iron	mg/L	U (.05)	U (.05)	NC	NC
Chemical Oxygen Demand	mg/L	6.23	U (5)	6.23	NC
Nitrate	mg/L	0.622	1.83	1.226	0.85
Nitrite	mg/L	U (.02)	U (.02)	NC	NC
Nitrogen, Ammonia	mg/L	0.0106	U (.093)	0.0106	NC
Phosphate-P	mg/L	U (.01)	U (.01)	NC	NC
Phosphorus	mg/L	U (.01)	U (.01)	NC	NC

^oC = degrees Centigrade
SU = standard units
mg/L = milligrams perliter
µS/cm = microsiemens per centimeter
U = non-detect at detection limit in parenthesis
NTU = nephelometric turbidity units
NC = not calculated

Table M 6. General Surface Water Quality Parameters for the Western Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled															Mean	Standard Deviation
		4/8/00	2/5/00	1/6/00	12/11/99	4/20/99	9/12/99	8/6/99	6/15/99	5/17/99	3/12/99	2/17/99	1/12/99	12/9/98	11/12/98	10/16/98		
Temperature	^oC	5.87	3.5	3.3	3.5	7.6	9	17.1	16.3	8.3	5.2	4.5	2.5	2.9	6	7.1	6.84	4.48
pH	SU	6.38	5.39	5.26	5.28	6.14	5.04	5.29	6.07	5.99	6.16	5.45	5.07	5.47	5	5.39	5.56	0.46
Dissolved Oxygen	mg/L	13.14	12.2	11.1	12.2	11.4	10	9.6	7.7	11.1	11.8	11.7	11.9	12.2	9.5	10.4	11.06	1.40
Turbidity	NTU	0.4	ND	ND	0.35	ND	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	17.58	29.81
Total Suspended Solids	mg/L	5.5	6	U (5)	U (5)	U (5)	32.1	U (5)	U (5)	U (5)	72	10	6	U (5)	U (5)	10	20.23	24.67
Hardness	mg/L	766	1790	2110	2050	879	2202	1470	1350	1080	666	1570	4170	2210	2120	2270	1780.20	866.39
Alkalinity	mg/L	ND	4	4	3	8	ND	4	5	6	10	10	4	14	4	29	8.08	7.09
Alkalinity, Total	mg/L	7.6	ND	ND	ND	ND	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.60	2.83
Bicarbonate Alkalinity	mg/L	7.6	4	4	3	8	3.6	4	5	6	10	10	4	14	U (4)	29	8.01	6.83
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	771	2200	2250	2240	890	2250	1880	1110	1120	640	1600	2160	2270	2100	2410	1726.07	638.45
Specific Conductance	µS/cm	1480	2900	2890	2920	1462	3370	2620	2200	1802	1194	2420	3160	3210	3160	904	2379.47	818.16
Total Dissolved Solids	mg/L	1270	3000	3120	3120	1320	3330	3080	2160	1720	1040	2320	3200	3300	3240	3510	2582.00	863.31
Total Cations	mEq/L	ND	38.2	44.7	43.6	18.7	ND	31	28.4	22.8	14.3	33.7	89.1	47.4	45.6	47.4	38.84	18.79
Total Anions	mEq/L	ND	46.4	47.5	47.2	18.9	ND	39.7	23.5	23.7	13.7	33.9	91.2	48.1	44.3	51.4	40.73	19.77
Cation-Anion Balance	ratio	ND	-9.7	-3	-4	-0.7	ND	-12.3	9.5	-1.9	2	-0.3	-1.2	-0.7	1.4	-4	-1.92	5.33
Chloride	mg/L	1.72	3	3	U (3)	2	2.19	2	1	2	2	2	3	3	3	4	2.42	0.77
Eh	mV	302	ND	ND	463	ND	407	413	ND	ND	ND	ND	ND	ND	ND	ND	396.25	67.66
Ferrous Iron	mg/L	U (.05)	0.01	U (.007)	0.02	U (.007)	U (.05)	0.02	0.06	U (.007)	0.12	U (.007)	U (.007)	U (.007)	0.03	0.04	0.04	0.04
Iron	µg/L	ND	10	20	30	U (7)	ND	30	U (7)	U (7)	510	U (7)	U (7)	10	100	20	91.25	171.67
Fluoride	mg/L	ND	0.8	0.7	0.9	0.4	ND	0.7	0.6	0.6	0.4	0.8	1	0.9	0.8	1.4	0.77	0.26
Silica	mg/L	ND	43.2	48.3	47	47.1	ND	42.3	49.1	45	44.6	45.9	44.6	50.3	53.1	14.6	44.24	9.39
Total Inorganic Carbon	mg/L	ND	1	U (1)	U (1)	2	ND	1	48	U (1)	3	1	U (1)	U (1)	U (1)	7	9.00	17.33
Chemical Oxygen Demand	mg/L	27.1	ND	ND	ND	ND	U (5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	27.10	NC
Nitrate	mg/L	U (.05)	0.15	ND	0.06	U (.05)	U (.03)	U (.05)	U (.05)	U (.05)	U (.05)	0.1	0.22	0.3	0.16	U (.05)	0.17	0.09
Nitrite	mg/L	U (.05)	U (.01)	ND	U (.01)	U (.05)	U (.02)	U (.01)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	ND	0.15	0.07	0.06	U (.02)	ND	U (.02)	U (.02)	U (.02)	U (.02)	0.08	0.2	0.29	0.21	U (.02)	0.15	0.09
Nitrogen, Ammonia	mg/L	U (.01)	ND	ND	ND	ND	U (.0439)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	NC
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	U (.3)	U (.5)	U (.2)	0.2	ND	0.20	NC
Phosphate-P	mg/L	0.0411	ND	ND	ND	ND	0.0221	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.01
Phosphorus	mg/L	0.045	U (.01)	U (.01)	0.08	U (.01)	0.0196	U (.01)	U (.01)	U (.01)	0.11	0.02	0.02	U (.02)	U (.01)	U (.01)	0.05	0.04

^oC = degrees Centigrade
SU = Standard Units
mg/L = milligrams per liter
NTU = nephelometric turbidity unit
µS/cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
mV = millivolts
µg/L = micrograms/liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 7. General Surface Water Quality Parameters for the Central Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled															Mean	Standard Deviation
		1/7/00	1/12/99	2/3/00	2/17/99	3/11/99	4/8/00	4/22/99	5/19/99	6/13/99	8/6/99	9/12/99	10/16/98	11/10/98	12/8/98	12/9/99		
Temperature	^{o}C	6.9	5.7	6	5.4	6.5	6.39	8.1	9.9	11.6	16.8	12.9	9	8.7	6.5	6.8	8.48	3.18
pH	SU	5.36	5.08	5.41	5.26	5.03	5.13	4.87	4.98	4.62	5.26	5.21	5.22	5.34	5.01	5.16	5.13	0.21
Dissolved Oxygen	mg/L	9.3	9.7	11.8	8.9	9.6	8.04	9.1	8.9	7.6	7.3	8.7	9.2	8.1	8.8	9	8.94	1.05
Turbidity	NTU	ND	ND	ND	ND	ND	3.6	ND	ND	ND	ND	26	ND	ND	ND	0.52	10.04	13.91
Total Suspended Solids	mg/L	U (5)	U (5)	U (5)	U (5)	U (5)	18	U (5)	U (5)	U (5)	U (5)	6.3	U (5)	U (5)	U (5)	U (5)	12.15	8.27
Hardness	mg/L	2180	4650	2160	2260	1330	1424	1150	1730	1730	1550	1965	2060	2230	2280	2070	2051.27	806.28
Alkalinity	mg/L	7	5	5	4	U (3)	ND	6	6	9	9	ND	6	5	5	5	6.00	1.60
Alkalinity, Total	mg/L	ND	ND	ND	ND	ND	4.2	ND	ND	ND	ND	7.4	ND	ND	ND	ND	5.80	2.26
Bicarbonate Alkalinity	mg/L	7	5	5	4	U (3)	4.2	6	6	9	9	7.4	6	5	5	5	5.97	1.60
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	2580	2540	2510	2500	1400	1530	1650	1750	1920	2070	2100	2350	2460	2540	2440	2156.00	412.27
Specific Conductance	µS/cm	3270	3390	3240	3460	2110	2700	2370	2590	2740	2710	3310	915	912	3540	3220	2698.47	839.74
Total Dissolved Solids	mg/L	3410	3650	3410	3530	2180	2390	2380	2570	2840	3310	3130	3420	3470	3600	3320	3107.33	498.49
Total Cations	mEq/L	50.5	111	49.9	53.7	31.3	ND	28.2	40.6	41.1	36.6	ND	49.4	53.6	54.2	49	49.93	20.29
Total Anions	mEq/L	54.8	107	53.3	52.7	29.6	ND	34.9	37	40.6	44	ND	49.7	51.9	53.5	51.8	50.83	18.79
Cation-Anion Balance	ratio	-4.1	1.8	-3.3	0.9	2.8	ND	-10.6	4.6	0.7	-9.2	ND	-0.2	1.6	0.6	-2.8	-1.32	4.53
Chloride	mg/L	3	3	3	3	2	2.27	3	3	2	2	2.92	5	3	2	U (3)	2.80	0.78
Eh	mV	ND	ND	ND	ND	ND	359	ND	ND	ND	454	371	ND	ND	ND	453	409.25	51.33
Ferrous Iron	mg/L	0.01	U (.007)	U (.007)	U (.007)	0.06	U (.05)	U (.007)	U (.007)	0.03	0.04	U (.05)	0.12	U (.007)	U (.007)	U (.007)	0.05	0.04
Iron	µg/L	U (7)	140	U (7)	170	200	ND	U (7)	U (7)	10	20	ND	120	450	100	100	145.56	130.01
Fluoride	mg/L	0.9	1.1	1	1.2	0.9	ND	0.9	1	1	1	ND	0.9	1	1	1	0.99	0.09
Silica	mg/L	53.4	55.8	47.7	55.8	59.3	ND	46.5	62	59.9	53.1	ND	65.4	66.1	61.9	57	57.22	6.08
Total Inorganic Carbon	mg/L	U (1)	6	U (1)	5	2	ND	6	8	U (5)	5	ND	U (1)	6	4	4	5.11	1.69
Chemical Oxygen Demand	mg/L	ND	ND	ND	ND	ND	22.8	ND	ND	ND	ND	U (5)	ND	ND	ND	ND	22.80	NC
Nitrate	mg/L	ND	5.73	4.64	4.55	1.29	0.802	1.72	2.36	2.81	3.92	4.15	6.33	6	6.23	4.4	3.92	1.86
Nitrite	mg/L	ND	0.05	U (.02)	U (.05)	U (.05)	0	U (.05)	U (.05)	U (.05)	U (.01)	U (.02)	U (.05)	U (.05)	U (.05)	U (.02)	0.03	0.04
Nitrate/Nitrite	mg/L	4.52	4.95	4.64	4.63	1.42	ND	1.96	2.43	3.19	3.92	ND	5.64	6.14	6.08	4.4	4.15	1.51
Nitrogen, Ammonia	mg/L	ND	ND	ND	ND	ND	U (.01)	ND	ND	ND	ND	U (.0435)	ND	ND	ND	ND	NC	NC
Nitrogen, Kjeldahl	mg/L	ND	0.6	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	0.4	0.6	ND	0.55	0.10
Phosphate-P	mg/L	ND	ND	ND	ND	ND	0.0444	ND	ND	ND	ND	0.039	ND	ND	ND	ND	0.04	0.00
Phosphorus	mg/L	U (.01)	0.03	U (.02)	0.02	0.04	0.0488	0.01	U (.01)	U (.01)	U (.03)	0.0298	U (.01)	0.02	U (.01)	0.02	0.03	0.01

^{o}C = degrees Centigrade
SU = Standard Units
mg/L = milligrams per liter
NTU = nephelometric turbidity unit
µS/cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
mV = millivolts
µg/L = micrograms/liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 8. General Surface Water Quality Parameters for the Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled																														Mean	Standard Deviation
		4/6/00	4/6/00	4/6/00	4/6/00	4/5/00	3/9/00	3/9/00	9/26/99	9/25/99	9/10/99	9/10/99	9/10/99	6/14/99	6/14/99	5/16/99	5/16/99	4/20/99	4/20/99	3/12/99	3/12/99	2/19/99	2/18/99	1/13/99	1/13/99	12/9/98	12/9/98	11/12/98	11/12/98	10/16/98	10/16/98		
Temperature	°C	8.17	6.68	6.12	5.21	7.01	5.1	3.9	14.46	15.45	16.4	14.8	13.5	18.4	18.9	12	12.9	10.5	10.9	5.1	5	5	2.7	3.8	2.5	3.3	2.5	8.2	7.6	12	10	8.94	4.96
pH	SU	8.89	8.59	8.28	8.78	8.5	7.91	7.47	7.37	7.32	7.35	7.63	7.41	6.94	6.8	7.43	7.15	7.2	7.62	8.02	8.09	7.8	7.76	7.39	7.52	7.85	7.89	7.04	7.19	7.3	7.55	7.67	0.53
Dissolved Oxygen	mg/L	11.88	13.11	12.62	13.45	13.25	10.07	10.45	9.3	8	9.4	9.8	9.2	8.5	8.1	10	7.7	9.9	10.1	11.7	12.1	12.6	12.2	11.9	12.5	12.4	12.7	10	11.4	9.8	10.2	10.81	1.70
Turbidity	NTU	0.6	10.7	10.1	14.2	5	330	470	55	1	0	0	160	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	88.05	155.46
Total Suspended Solids	mg/L	10.2	U (4)	14.7	4.2	7.2	U (4)	6.6	5.8	14.7	U (4)	5.7	4.2	22	10	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	9.57	5.56
Hardness	mg/L	609	770	1152	929	977	587	817	2433	2494	2623	2529	2533	2060	2080	1850	1870	1950	1620	875	924	661	1030	1640	2300	1070	1330	2530	2440	2390	2130	1640.10	714.01
Alkalinity	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	33	22	37	23	23	37	140	147	147	157	153	161	133	159	17	31	18	4	80.11	64.72
Alkalinity, Total	mg/L	152	147	140	161	113	102	91.2	19.4	18.2	23.4	31.6	29.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	85.72	57.76
Bicarbonate Alkalinity	mg/L	152	147	140	161	113	102	91.2	19.4	18.2	23.4	31.6	29.8	33	22	37	23	23	37	140	147	147	157	153	161	133	159	17	31	18	4	82.35	61.06
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	458	634	904	792	893	499	742	2380	2540	2530	2430	2430	2170	2170	1930	2010	1800	1760	720	700	530	900	670	970	1010	1230	2260	2370	2520	2270	1507.40	778.65
Specific Conductance	µS/cm	1230	1520	1920	17	1960	1300	1700	3580	4000	3810	3740	3740	2980	3030	2770	2770	2650	2580	1482	1547	1164	1723	1370	1822	1872	2180	3580	3420	1025	985	2248.90	1042.19
Total Dissolved Solids	mg/L	968	1140	1490	1260	1360	938	1300	4140	3650	3860	3820	3780	3130	3230	2870	2870	2700	2620	1290	1360	970	1500	1140	1600	1690	1990	3820	3630	3640	3340	2369.87	1123.90
Total Cations	mEq/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	42.7	43	38.1	38.7	40.2	33.7	18.4	19.3	13.9	21.6	34.5	48.1	22.3	27.7	52.7	50.9	49.7	45.7	35.62	12.36
Total Anions	mEq/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	46.4	46.1	41.4	42.8	38.3	37.9	18	17.7	14.2	22.1	34.5	47.4	24	29.1	48	50.6	53.5	47.9	36.66	12.70
Cation-Anion Balance	ratio	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-4.1	-3.5	-4.1	-5.1	2.4	-5.9	1	4.3	-1	-1.2	0.1	0.7	-3.6	-2.4	4.6	0.3	-3.6	-2.3	-1.30	3.09
Chloride	mg/L	1.31	1.44	1.76	1.8	1.8	1.37	1.86	3.64	3.66	3.73	3.63	3.52	2	2	3	3	3	3	2	2	2	2	2	3	2	2	4	4	4	3	2.58	0.88
Eh	mV	241	206	120	261	234	318	335	305	290	182	257	282	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	252.58	61.34
Ferrous Iron	mg/L	U (.007)	U (.05)	U (.007)	U (.007)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	U (.007)	0.01	U (.007)	0.01	U (.007)	U (.007)	U (.007)	U (.007)	0.05	U (.007)	0.02	0.08	0.03	0.03
Iron	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	U (7)	U (7)	U (7)	U (7)	U (7)	U (7)	U (7)	90	U (7)	20	U (7)	U (7)	U (7)	U (7)	U (7)	U (7)	U (7)	30	46.67	37.86
Fluoride	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4	1.1	1.4	1.6	U (.1)	1.3	0.9	0.6	0.6	0.5	0.8	0.7	0.9	0.8	1.8	1.7	1.6	0.7	1.08	0.43
Silica	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.1	11.9	14.5	10.6	11	15.5	40.4	47.1	39.5	45.8	41.9	45.6	40.4	46.7	10.8	16.8	10.4	48.8	28.54	16.20
Total Inorganic Carbon	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	5	8	4	5	8	33	35	36	28	35	38	30	35	4	7	4	U (1)	19.12	14.47
Chemical Oxygen Demand	mg/L	42.1	18.6	U (5)	17	39.3	6.96	17.6	U (5)	U (5)	5.14	U (5)	U (5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.96	14.50
Nitrate	mg/L	0.158	0.234	0.285	0.331	0.167	0.515	0.738	1.58	1.57	1.52	1.44	1.39	1.03	1.1	0.92	0.95	0.84	0.87	0.74	1	0.33	0.98	0.47	1.08	0.61	1.02	2.27	2.12	2.19	2.11	1.02	0.62
Nitrite	mg/L	U (.05)	U (.02)	U (.02)	U (.02)	U (.02)	U (.05)	U (.05)	U (.02)	U (.02)	U (.05)	U (.05)	U (.02)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.18	1.27	1.01	1.03	0.9	0.89	0.78	1.06	0.36	1.03	0.46	1.08	0.59	0.98	2.59	2.43	2	1.87	1.20	0.63
Nitrogen, Ammonia	mg/L	U (.01)	0.017	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	U (.0315)	U (.0643)	U (.0876)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	NC
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	U (.2)	0.4	U (.3)	U (.4)	U (.1)	U (.2)	U (.1)	0.2	ND	ND	0.30	0.14
Phosphate-P	mg/L	0.0647	0.0524	0.0823	0.0696	0.0416	0.179	0.133	0.0104	0.014	0.0196	0.0221	0.0165	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.05
Phosphorus	mg/L	0.0859	0.0792	0.0481	0.0687	0.053	0.162	0.118	U (.01)	0.0116	0.0186	0.0272	0.016	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	0.01	0.04	0.08	0.04	0.07	0.05	0.08	0.06	0.05	U (.01)	U (.01)	U (.01)	U (.01)	0.06	0.04

°C = degrees Centigrade
SU = Standard Units
mg/L = milligrams/liter
NTU = nephelometric turbidity unit
µS/cm = microsiemens/centimeter
mEq/L = milliequivalents/liter
mV = millivolts
µg/L = micrograms/liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 9. General Surface Water Quality Parameters for the Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled												Mean	Standard Deviation
		4/5/00	3/9/00	9/9/99	6/14/99	5/16/99	4/20/99	3/12/99	2/17/99	1/13/99	12/9/98	11/12/98	10/15/98		
Temperature	^oC	7.15	3.7	15.6	18.7	11.6	9.6	4.7	3.2	2.4	2.5	6.9	9.8	7.99	5.28
pH	SU	8.15	6.88	7.15	6.87	7.35	7.21	7.36	6.91	6.77	6.97	7.24	7.36	7.19	0.37
Dissolved Oxygen	mg/L	12.96	10.78	9.3	7.9	10	10.5	11.5	12.2	12.5	11.8	11	9.5	10.83	1.48
Turbidity	NTU	2	10	74	ND	ND	ND	ND	ND	ND	ND	ND	ND	28.67	39.46
Total Suspended Solids	mg/L	U (4)	5.1	U (4)	8	U (5)	U (5)	U (5)	U (5)	12	U (5)	U (5)	U (5)	8.37	3.46
Hardness	mg/L	915	682	2443	2040	1880	1840	883	1310	3060	1690	2430	2290	1788.58	727.91
Alkalinity	mg/L	ND	ND	ND	33	35	37	68	71	80	86	30	29	52.11	23.57
Alkalinity, Total	mg/L	88	57.8	30.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	58.67	28.91
Bicarbonate Alkalinity	mg/L	88	57.8	30.2	33	35	37	68	71	80	86	30	29	53.75	23.77
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	869	649	2360	2120	1870	1620	850	1240	1470	1580	2490	2440	1629.83	643.60
Specific Conductance	µS/cm	1830	1500	3440	2940	2720	2510	1490	2130	2340	2580	3440	1059	2331.58	761.77
Total Dissolved Solids	mg/L	1430	1100	3580	3140	2780	2570	1330	1900	2190	2470	3620	3500	2467.50	896.04
Total Cations	mEq/L	ND	ND	ND	42.3	38.9	38.1	18.9	27.9	64.5	35.6	50.7	47.7	40.51	13.19
Total Anions	mEq/L	ND	ND	ND	45.3	40.1	34.9	19.3	27.6	65.2	35	53.1	51.9	41.38	14.11
Cation-Anion Balance	ratio	ND	ND	ND	-3.4	-1.6	4.4	-1	0.5	-0.5	0.8	-2.3	-4.2	-0.81	2.56
Chloride	mg/L	1.77	1.81	3.42	2	3	3	2	2	3	3	4	4	2.75	0.82
Eh	mV	179	U (365)	157	ND	ND	ND	ND	ND	ND	ND	ND	ND	168.00	15.56
Ferrous Iron	mg/L	U (.05)	U (.05)	U (.05)	0.01	U (.007)	U (.007)	0.02	0.01	U (.007)	0.02	U (.007)	0.01	0.01	0.01
Iron	µg/L	ND	ND	U (7)	U (7)	U (7)	U (7)	30	20	40	20	U (7)	U (7)	27.50	9.57
Fluoride	mg/L	ND	ND	ND	1.1	1.5	1.2	0.7	0.8	0.9	0.9	1.6	1.2	1.10	0.31
Silica	mg/L	ND	ND	ND	18.4	17.1	19.9	47.9	44.2	84.3	43.3	17.8	16.7	34.40	22.92
Total Inorganic Carbon	mg/L	ND	ND	ND	10	8	8	17	18	20	20	7	7	12.78	5.80
Chemical Oxygen Demand	mg/L	U (5)	15.5	U (5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	15.50	NC
Nitrate	mg/L	1.01	0.448	1.23	0.9	0.82	0.78	0.67	1.02	1.18	1.09	2.02	1.83	1.08	0.45
Nitrite	mg/L	U (.02)	U (.1)	U (.02)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	ND	ND	ND	1.02	0.9	0.82	0.77	1.14	1.21	1.09	2.3	1.44	1.19	0.47
Nitrogen, Ammonia	mg/L	U (.01)	U (.01)	U (.447)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	NC
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	ND	ND	ND	ND	U (.3)	0.6	U (.2)	0.2	ND	0.40	0.28
Phosphate-P	mg/L	0.03	0.111	0.015	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05
Phosphorus	mg/L	0.0325	0.084	0.0165	U (.01)	U (.01)	U (.01)	0.06	0.03	0.04	0.03	U (.01)	U (.01)	0.04	0.02

^oC = degrees Centigrade
SU = Standard Units
mg/L = milligrams per liter
NTU = nephelometric turbidity unit
µS per cm = microsiemens per centimeter
mEq/L = milliequivalents per liter
mV = millivolts
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 10. General Surface Water Quality Parameters for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled											Mean	Standard Deviation
		4/5/00	9/30/99	6/14/99	5/16/99	4/21/99	3/12/99	2/18/99	1/13/99	12/9/98	11/12/98	10/15/98		
Temperature	°C	5.72	4.17	15.2	10	8.5	6.3	3.1	1.7	1.7	4.8	7.7	6.26	3.99
pH	SU	6.97	6.54	6.97	7.55	6.83	7.08	6.59	6.73	7.06	7.5	7.85	7.06	0.42
Dissolved Oxygen	mg/L	13.61	16.9	10	11.2	11	11.8	12.3	12.9	13.4	11.3	10.6	12.27	1.92
Turbidity	NTU	4.4	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.70	0.99
Total Suspended Solids	mg/L	5.6	7.1	8	U (5)	U (5)	10	U (5)	U (5)	U (5)	U (5)	U (5)	7.68	1.84
Hardness	mg/L	27.6	38.3	49	40	30	35	59	122	68	115	94	61.63	34.10
Alkalinity	mg/L	ND	ND	46	42	36	38	49	49	53	55	56	47.11	7.22
Alkalinity, Total	mg/L	33.2	50.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	41.90	12.30
Bicarbonate Alkalinity	mg/L	33.2	50.6	46	42	36	38	49	49	53	55	56	46.16	7.83
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	3.6	2.88	20	20	U (10)	30	20	20	30	70	60	27.65	21.80
Specific Conductance	µS/cm	84	119	127.3	94.5	76.4	88.2	146.9	152.8	177.6	250	160	134.25	51.28
Total Dissolved Solids	mg/L	94	120	120	120	170	150	140	120	130	180	170	137.64	26.93
Total Cations	mEq/L	ND	ND	1.6	1.2	1.3	1.5	1.6	3.1	1.7	2.7	2.3	1.89	0.66
Total Anions	mEq/L	ND	ND	1.4	1.3	1	1.5	1.4	2.9	1.8	2.6	2.4	1.81	0.66
Cation-Anion Balance	ratio	ND	ND	7.1	-4.1	13.9	0.5	4.7	3.2	-0.5	2	-2.5	2.70	5.45
Chloride	mg/L	0.744	0.961	U (1)	2	3	2	1	2	2	U (1)	U (1)	1.71	0.76
Eh	mV	233	298	ND	ND	ND	ND	ND	ND	ND	ND	ND	265.50	45.96
Ferrous Iron	mg/L	U (.05)	U (.05)	U (.007)	U (.007)	0.01	0.02	0.01	U (.007)	U (.007)	0.01	0.04	0.02	0.01
Iron	µg/L	ND	ND	210	330	410	750	200	90	120	50	90	250.00	221.98
Fluoride	mg/L	ND	ND	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	U (.1)	0.13	0.05
Silica	mg/L	ND	ND	48.1	46.5	53.3	51.2	38.3	36.6	37.2	39.3	37.6	43.12	6.62
Total Inorganic Carbon	mg/L	ND	ND	10	10	8	9	13	13	13	13	13	11.33	2.06
Chemical Oxygen Demand	mg/L	9.93	U (5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.93	NC
Nitrate	mg/L	0.064	0.091	U (.05)	U (.05)	0.05	0.16	0.19	0.34	0.25	0.12	0.1	0.15	0.09
Nitrite	mg/L	U (.02)	U (.02)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	ND	ND	U (.02)	U (.02)	0.04	0.13	0.17	0.43	0.22	0.16	0.07	0.17	0.13
Nitrogen, Ammonia	mg/L	U (.01)	U (.0769)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	NC
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	ND	ND	ND	U (.2)	U (.4)	U (.3)	U (.1)	ND	NC	NC
Phosphate-P	mg/L	0.131	0.0737	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10	0.04
Phosphorus	mg/L	0.168	0.0987	0.06	0.09	0.14	0.17	0.09	0.07	0.11	0.01	U (.01)	0.10	0.05

C = degrees Centigrade
SU = standard units
mg per L = milligrams per liter
NTU = nephelometric turbidity unit
µS/cm = microsiemens percentimeter
mEq/L = milliequivilents per liter
mV = millivolts
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 11. General Surface Water Quality Parameters for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled																						Mean	Standard Deviation
		4/5/00	4/4/00	9/29/99	9/29/99	6/14/99	6/14/99	5/16/99	5/16/99	4/21/99	4/21/99	3/12/99	3/12/99	2/18/99	2/18/99	1/13/99	1/13/99	12/9/98	12/9/98	11/12/98	11/11/98	10/15/98	10/15/98		
Temperature	°C	5.21	9.22	11.83	7.37	16.2	15	9.5	8.9	9.5	10.9	6	5.4	3.3	4.4	3.2	2.3	2	1.7	6.5	3.8	8.7	7.3	7.19	4.01
pH	SU	7.79	8.02	7.57	7.81	6.91	7	7.49	7.48	6.69	6.94	7.2	7.14	6.98	7.33	6.48	6.22	7.02	7.42	7.3	7.73	7.21	6.95	7.21	0.44
Dissolved Oxygen	mg/L	13.82	11.84	16.4	11	9.4	9.9	10.6	11.9	10.9	10.9	11.9	11.6	12.6	12.6	12.5	13.3	14.9	13.9	10.6	12.6	10.5	12.1	12.08	1.67
Turbidity	NTU	185	100	8	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100.75	72.54
Total Suspended Solids	mg/L	7.6	60.4	11	20.1	16	10	U (5)	U (5)	U (5)	U (5)	16	6	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	U (5)	18.39	17.62
Hardness	mg/L	93.6	81.2	2067	1942	1230	1140	669	698	320	382	101	85	331	293	1140	1080	687	852	2170	2010	1900	1940	964.17	743.30
Alkalinity	mg/L	ND	ND	ND	ND	39	42	40	43	36	38	40	41	53	53	57	56	65	63	33	33	34	35	44.50	10.48
Alkalinity, Total	mg/L	38.8	36.8	32.4	36.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36.20	2.70
Bicarbonate Alkalinity	mg/L	38.8	36.8	32.4	36.8	39	42	40	43	36	38	40	41	53	53	57	56	65	63	33	33	34	35	42.99	10.03
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	63.6	6.48	1990	1970	1180	1120	650	660	280	340	80	70	290	240	510	500	600	750	2120	1980	1980	2010	881.37	768.89
Specific Conductance	µS/cm	237	179	3240	3810	1925	1810	1215	1233	603	681	199	199.5	834	585	1004	997	1223	1469	3200	3020	878	930	1339.61	1073.41
Total Dissolved Solids	mg/L	117	42	3090	2880	1830	1710	1040	1030	500	570	240	220	510	430	830	780	980	1190	3160	3040	2960	3000	1370.41	1128.54
Total Cations	mEq/L	ND	ND	ND	ND	25.7	23.9	14	14.5	7	8.2	2.8	2.2	7.2	6.4	24.2	23.1	14.6	17.9	45.3	41.8	39.8	40.5	19.95	14.08
Total Anions	mEq/L	ND	ND	ND	ND	25.7	24.5	14.5	14.8	6.7	8	2.5	2.4	7.2	6.2	23.9	23.5	14	17.1	45.4	42.4	42.3	43	20.23	14.64
Cation-Anion Balance	ratio	ND	ND	ND	ND	ND	-1.1	-1.7	-0.9	2.7	1.4	4.8	-3.9	0.3	1.7	0.8	-1	2.1	2.4	ND	-0.7	-3.1	-2.9	0.06	2.39
Chloride	mg/L	0.837	0.955	3.34	3.11	2	2	2	2	2	2	2	2	1	2	2	4	2	2	4	4	4	4	2.42	1.04
Eh	mV	228	254	121	251	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	213.50	62.75
Ferrous Iron	mg/L	U (.05)	U (.05)	U (.05)	U (.05)	0.12	0.21	0.08	0.05	U (.007)	U (.007)	0.11	0.07	0.04	U (.007)	0.01	U (.007)	U (.007)	U (.007)	U (.007)	0.05	0.02	0.01	0.07	0.06
Iron	µg/L	ND	ND	ND	ND	U (7)	U (7)	170	90	80	20	540	470	140	60	70	20	70	U (7)	10	U (7)	30	U (7)	136.15	170.71
Fluoride	mg/L	ND	ND	ND	ND	0.9	0.8	0.5	0.5	0.3	0.3	0.1	0.2	0.2	0.3	0.4	0.6	0.4	0.7	1.4	1.2	1.2	1.2	0.62	0.41
Silica	mg/L	ND	ND	ND	ND	29.4	29.6	33.4	31.3	44.6	41.2	50.2	43.7	39.9	39.4	38.2	35.7	37.1	32.9	21.5	22.4	21	20.8	34.02	8.74
Total Inorganic Carbon	mg/L	ND	ND	ND	ND	10	10	10	10	8	8	10	10	14	14	15	14	15	14	8	8	8	8	10.78	2.73
Chemical Oxygen Demand	mg/L	60	10.9	U (5)	U (5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35.45	34.72
Nitrate	mg/L	0.046	U (.03)	1.13	0.866	0.51	0.36	0.28	0.11	0.16	0.14	0.19	0.27	0.35	0.23	0.57	0.56	0.52	0.54	1.74	1.49	1.47	1.32	0.61	0.52
Nitrite	mg/L	U (.02)	U (.02)	U (.02)	U (.02)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	U (.05)	NC	NC
Nitrate/Nitrite	mg/L	ND	ND	ND	ND	0.54	0.38	0.3	0.12	0.11	0.16	0.18	0.16	0.35	0.21	0.59	0.56	0.5	0.52	2.02	1.59	1.62	1.31	0.62	0.59
Nitrogen, Ammonia	mg/L	U (.01)	U (.01)	U (.01)	U (.01)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	NC
Nitrogen, Kjeldahl	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	U (.3)	U (.3)	U (.2)	U (.3)	U (.3)	U (.1)	U (.1)	U (.1)	ND	ND	NC	NC
Phosphate-P	mg/L	0.135	0.16	0.0206	0.0165	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08
Phosphorus	mg/L	0.157	0.163	0.0242	0.0247	0.02	0.02	0.06	0.03	0.11	0.1	0.16	0.18	0.07	0.07	0.07	0.06	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	U (.01)	0.08	0.06

C = degrees Centigrade
SU = standard units
mg/L = milligrams per liter
NTU = nephelometric turbidity unit
µS/cm = microsiemens per centimeter
mEq/L = milliequivilents per liter
mV = millivolts
µg/L = micrograms per liter
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 12. General Surface Water Quality Parameters for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Date Sampled				Mean	Standard Deviation
		4/4/00	4/4/00	9/28/99	9/28/99		
Temperature	^{o}C	9.2	6.54	6.97	4.49	6.80	1.93
pH	SU	7.83	7.49	7.68	7.23	7.56	0.26
Dissolved Oxygen	mg/L	11.74	12.58	11.2	12	11.88	0.57
Turbidity	NTU	3.9	19.6	47	0	17.63	21.34
Total Suspended Solids	mg/L	9.3	8.6	4.9	7.3	7.53	1.94
Hardness	mg/L	67.2	75.3	1934	1946	1005.63	1078.94
Alkalinity, Total	mg/L	43.2	43.8	35.4	36	39.60	4.52
Bicarbonate Alkalinity	mg/L	43.2	43.8	35.4	36	39.60	4.52
Carbonate Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	NC	NC
Hydroxide Alkalinity	mg/L	U (2)	U (2)	U (2)	U (2)	NC	NC
Sulfate	mg/L	32.2	34.3	1950	1940	989.13	1103.76
Specific Conductance	µS/cm	174	1730	3250	3150	2076.00	1445.58
Total Dissolved Solids	mg/L	169	102	2960	3040	1567.75	1654.37
Chloride	mg/L	0.879	0.887	3.04	3.02	1.96	1.24
Eh	mV	218	211	261	177	216.75	34.51
Ferrous Iron	mg/L	U (.05)	U (.05)	U (.05)	0.1	0.10	NC
Chemical Oxygen Demand	mg/L	34.3	22.3	U (5)	U (5)	28.30	8.49
Nitrate	mg/L	U (.03)	0.041	0.817	0.665	0.51	0.41
Nitrite	mg/L	U (.02)	U (.02)	U (.02)	U (.02)	NC	NC
Nitrogen, Ammonia	mg/L	U (.01)	U (.01)	U (.0195)	U (.0122)	NC	NC
Phosphate-P	mg/L	0.18	0.124	0.0523	0.016	0.09	0.07
Phosphorus	mg/L	0.166	0.17	0.0252	0.0165	0.09	0.09

C = degrees Centigrade
SU = standard units
mg/L = milligrams/liter
NTU = nephelometric turbidity unit
µS/cm = microsiemens/centimeter
mV = millivolts
U = non-detect at detection limit in parenthesis
NC = not calculated

Table 13. General Sediment Quality Parameters for Pit 3
Midnite Mine Site
Wellpinit, WA

Parameter	Units	Date Sampled		Mean
		9/25/2000	9/26/2000	
pH	SU	7.31	7.29	7.3
Alkalinity, Total	mg/kg	77.7	81.7	79.7
Bicarbonate Alkalinity	mg/kg	77.7	81.7	79.7
Carbonate Alkalinity	mg/kg	U (8)	U (8)	U (8)
Total Organic Carbon	mg/kg	1665	2800	2232
Sulfate	mg/kg	1947	671	1309
Chloride	mg/kg	2.93	1.45	2.19
Nitrate	mg/kg	0.3	0.137	0.218
Nitrite	mg/kg	0.067	0.268	0.167
Nitrogen, Ammonia	mg/kg	0.89	2.69	1.79
Phosphate-P	mg/kg	0.928	0.865	0.9
Phosphorus	mg/kg	158	277	217

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in paraenthesis

Table M 14a. General Sediment Quality Parameters for the Western Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Units	Date Sampled							Mean	Standard Deviation
		10/9/00	10/9/00	10/9/00	10/4/00	9/12/99	9/11/99	9/8/99		
pH	SU	4.73	6.61	6.55	5.33	6.16	6.14	4.59	5.73	0.84
Alkalinity, Total	mg/kg	0	77.5	89.9	58.8	105	45.9	17	56.30	38.25
Bicarbonate Alkalinity	mg/kg	0	77.5	89.9	58.8	105	45.9	17	56.30	38.25
Carbonate Alkalinity	mg/kg	U (8)	U (9)	U (8)	U (9)	U (10)	U (10)	U (10)	NC	NC
Total Organic Carbon	mg/kg	20550	24800	20000	47550	11850	4250	3600	18942.86	15044.20
Cation Exchange Capacity	mEq/g	0.114	ND	0.0317	ND	ND	ND	ND	0.07	0.06
Calcium	mEq/100g	3.54	ND	6.24	ND	ND	ND	ND	4.89	1.91
Magnesium	mEq/100g	2.28	ND	1.61	ND	ND	ND	ND	1.95	0.47
Sodium	mEq/100g	0.08	ND	0.037	ND	ND	ND	ND	0.06	0.03
Potassium	mEq/100g	0.165	ND	0.412	ND	ND	ND	ND	0.29	0.17
Sulfate	mg/kg	640	579	18.3	2404	972	15.5	770	771.26	806.07
Chloride	mg/kg	1.46	4.26	1.86	12	3.45	0.953	1.36	3.62	3.89
Nitrate	mg/kg	0.072	U (.02)	U (.02)	U (.02)	0.039	0.155	0.087	0.09	0.05
Nitrite	mg/kg	U (.02)	U (.02)	U (.02)	U (.02)	U (.02)	0.023	U (.02)	0.02	NC
Nitrogen, Ammonia	mg/kg	1.27	2.25	0.74	4.02	U (.201)	1.47	U (5.8)	1.95	1.28
Phosphate-P	mg/kg	0.232	2.41	4.5	3.13	0.775	1.1	ND	2.02	1.62
Phosphorus	mg/kg	252	379	301	376	1428	335	248	474.14	423.94

SU = standard units
mg/kg = milligrams per kilogram
mEq/g = milliequivalents per gram
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 14b. General Sediment Quality Parameters for the Central Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Units	Date Sampled					Mean	Standard Deviation
		10/3/00	10/3/00	9/12/99	9/11/99	9/9/99		
pH	SU	6.23	6.32	6.29	4.82	7.14	6.16	0.84
Alkalinity, Total	mg/kg	75	107	151	30	103	93.20	44.59
Bicarbonate Alkalinity	mg/kg	75	107	151	30	103	93.20	44.59
Carbonate Alkalinity	mg/kg	U (9)	U (9)	U (10)	U (10)	U (10)	NC	NC
Total Organic Carbon	mg/kg	29600	43200	7655	6485	4025	18193.00	17351.72
Cation Exchange Capacity	mEq/g	0.283	ND	ND	ND	ND	NC	NC
Calcium	mEq/100g	13.7	ND	ND	ND	ND	NC	NC
Magnesium	mEq/100g	5.22	ND	ND	ND	ND	NC	NC
Sodium	mEq/100g	0.191	ND	ND	ND	ND	NC	NC
Potassium	mEq/100g	0.467	ND	ND	ND	ND	NC	NC
Sulfate	mg/kg	511	28.4	438	205	2400	716.48	960.35
Chloride	mg/kg	1.84	1.77	4.79	5.62	4.13	3.63	1.75
Nitrate	mg/kg	0.145	1.13	0.043	0.117	0.914	0.47	0.51
Nitrite	mg/kg	0.448	0.39	U (.02)	U (.02)	0.258	0.37	0.10
Nitrogen, Ammonia	mg/kg	1.4	1.4	0.988	1.79	U (5.12)	1.39	0.33
Phosphate-P	mg/kg	1.44	U (.787)	8.66	5.86	ND	5.32	3.64
Phosphorus	mg/kg	382	574	483	521	268	445.60	121.61

SU = standard units
mg/kg = milligrams per kilogram
mEq/g = milliequivalents per gram
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 15. General Sediment Quality Parameters for the Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Parameter	Units	Date Sampled																	Mean	Standard Deviation
		10/10/00	10/9/00	10/2/00	10/2/00	10/2/00	10/2/00	10/2/00	10/1/00	9/27/99	9/26/99	9/26/99	9/26/99	9/25/99	9/10/99	9/10/99	9/10/99	9/9/99		
pH	SU	7.17	7.4	7.27	7.38	7.37	7.18	6.48	7.04	7.2	5.1	7.17	7.16	7.15	7.23	7.19	7.12	7	7.04	0.54
Alkalinity, Total	mg/kg	219	308	77.8	61.3	195	47.4	73.8	92	133	29	96	105	90	117	112	149	186	123.02	70.47
Bicarbonate Alkalinity	mg/kg	219	308	77.8	61.3	195	47.4	73.8	92	133	29	96	105	90	117	112	149	186	123.02	70.47
Carbonate Alkalinity	mg/kg	U (10)	U (10)	U (9)	U (8)	U (9)	U (8)	U (9)	U (9)	U (10)	U (10)	U (10)	U (10)	U (10)	U (10)	U (10)	U (10)	U (10)	NC	NC
Total Organic Carbon	mg/kg	65300	62650	29800	24500	55900	12800	64350	34000	22300	19450	24800	34450	6025	12500	12100	16650	36750	31430.88	19546.18
Sulfate	mg/kg	1775	2130	1128	823	952	640	1551	1784	1310	250	1780	1650	1650	940	1250	1330	1620	1327.24	489.03
Chloride	mg/kg	4.77	9.28	1.99	1.3	4.1	1.15	8.47	10.1	3.83	5.35	4.23	3.77	2.86	2.07	2.1	2.72	3.43	4.21	2.70
Nitrate	mg/kg	U (.02)	3.28	0.036	0.072	U (.02)	0.158	U (.02)	U (.02)	0.499	0.156	0.655	1.14	0.567	0.383	0.267	0.044	U (.03)	0.60	0.90
Nitrite	mg/kg	U (.02)	1.04	0.059	0.118	U (.02)	0.081	U (.02)	U (.02)	U (.02)	U (.02)	0.063	0.153	0.057	0.503	0.801	0.225	U (.02)	0.31	0.35
Nitrogen, Ammonia	mg/kg	6.51	33.5	2.72	2.85	5.09	0.973	6.03	5.57	2.41	U (.463)	U (.133)	U (.212)	U (.08)	U (6.83)	9.73	8.56	13.2	8.10	8.72
Phosphate-P	mg/kg	1.4	3.19	0.395	0.307	1.31	0.413	0.763	0.253	4.75	U (.5)	0.963	1.48	1.27	1.69	1.55	2.57	2.72	1.56	1.22
Phosphorus	mg/kg	452	853	304	198	396	163	403	373	785	646	450	386	432	32.8	11.6	2.81	471	374.07	245.51

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated

Table M 16. General Sediment Quality Parameters for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Parameter	**Units**	**Date Sampled** 9/30/99
pH	SU	7.58
Alkalinity, Total	mg/kg	51
Bicarbonate Alkalinity	mg/kg	51
Carbonate Alkalinity	mg/kg	U (10)
Total Organic Carbon	mg/kg	859
Sulfate	mg/kg	2.43
Chloride	mg/kg	0.593
Nitrate	mg/kg	0.225
Nitrite	mg/kg	0.024
Nitrogen, Ammonia	mg/kg	0.3
Phosphate-P	mg/kg	2.51
Phosphorus	mg/kg	193

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis

Table M 17. General Sediment Quality Parameters for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Parameter	Units	Date Sampled 9/29/99	9/29/99	Mean
pH	SU	7.36	7.3	7.33
Alkalinity, Total	mg/kg	49	47	48
Bicarbonate Alkalinity	mg/kg	49	47	48
Carbonate Alkalinity	mg/kg	U (10)	U (10)	NC
Total Organic Carbon	mg/kg	2900	1915	2407.5
Sulfate	mg/kg	501	710	605.5
Chloride	mg/kg	2.42	1.57	1.995
Nitrate	mg/kg	0.27	0.188	0.229
Nitrite	mg/kg	0.231	0.162	0.1965
Nitrogen, Ammonia	mg/kg	0.203	U (.06)	0.203
Phosphate-P	mg/kg	3.12	3.94	3.53
Phosphorus	mg/kg	164	191	177.5

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated

Table M 18. General Sediment Quality Parameters for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Parameter	Units	Date Sampled		Mean
		9/28/99	9/28/99	
pH	SU	7.89	6.9	7.395
Alkalinity, Total	mg/kg	71	48	59.5
Bicarbonate Alkalinity	mg/kg	71	48	59.5
Carbonate Alkalinity	mg/kg	U (10)	U (10)	NC
Total Organic Carbon	mg/kg	3360	626	1993
Sulfate	mg/kg	755	563	659
Chloride	mg/kg	2.22	1.88	2.05
Nitrate	mg/kg	0.277	1.13	0.7035
Nitrite	mg/kg	0.072	U (.02)	0.072
Nitrogen, Ammonia	mg/kg	0.202	0.164	0.183
Phosphate-P	mg/kg	4.52	1.59	3.055
Phosphorus	mg/kg	397	209	303

SU = standard units
mg/kg = milligrams/kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated

Table M 19. General Surface Soil Quality Parameters for the Mined Area
Midnite Mine Site
Wellpinit, WA

		Location and Date Sampled																	
		SMMA-01	SMMA-02	SMMA-03	SMMA-04	SMMA-05	SMMA-06	SMMA-07	SMMA-08	SMMA-09	SMMA-10	SMMA-11	SMMA-12	SMMA-13	SMMA-14	SMMA-15	SMMA-16		
Parameter	**Unit**	9/26/00	9/26/00	9/26/00	9/26/00	9/26/00	9/26/00	9/26/00	9/26/00	9/26/00	9/27/00	9/27/00	9/26/00	9/27/00	9/27/00	9/27/00	9/27/00	**Mean**	**Standard Deviation**
pH	SU	4.28	6.45	7.05	7.65	5.07	7.65	7.97	7.65	6.59	7.14	6.62	3.46	4.08	2.83	4.07	6.69	5.95	1.70
Total Organic Carbon	mg/kg	3080	2225	7335	2630	1460	1440	4625	10110	20700	5115	5155	1570	5315	739	1605	2010	4694.63	4962.77
Alkalinity, Total	mg/kg	24.5	610	146	217	185	199	217	285	116	72.6	424	U (8)	26.3	U (9)	17.6	522	218.71	185.13
Bicarbonate Alkalinity	mg/kg	24.5	610	146	217	185	198	217	285	116	72.6	424	U (8)	26.3	U (9)	17.6	522	218.64	185.13
Carbonate Alkalinity	mg/kg	U (9)	U (8)	U (9)	U (9)	U (8)	U (9)	U (9)	U (9)	U (9)	U (9)	U (8)	U (8)	U (8)	U (9)	U (9)	U (9)	NC	NC
Chloride	mg/kg	1.56	0.321	0.263	0.556	0.251	0.186	0.883	0.781	4.77	0.437	0.602	0.387	0.842	0.187	0.367	0.403	0.80	1.12
Sulfate	mg/kg	333	1055	7.14	8.51	90.1	146	7.36	28.3	1.81	12.2	385	149	295	2655	541	1012	420.40	685.56
Nitrate	mg/kg	0.523	0.178	ND	0.024	0.409	1.03	ND	0.032	ND	0.133	0.065	0.446	0.423	0.244	0.703	0.16	0.34	0.30
Nitrite	mg/kg	0.066	0.082	U (.02)	U (.02)	0.042	0.054	U (.02)	U (.02)	U (.02)	0.044	0.024	U (.02)	U (.02)	U (.2)	U (.2)	0.036	0.05	0.02
Nitrogen, Ammonia	mg/kg	1.92	1.06	ND	ND	0.824	0.198	0.134	0.544	0.723	0.3	0.438	2.1	2.21	2.15	2.25	0.704	1.11	0.82
Phosphate-P	mg/kg	0.565	0.629	0.936	1.22	0.637	0.681	2.2	2.28	2.15	1.07	0.65	0.477	U (.2)	U (.2)	U (.2)	U (.2)	1.12	0.69
Phosphorus	mg/kg	493	378	490	282	293	279	310	467	346	279	470	472	517	577	534	383	410.63	102.93

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 20. General Surface Soil Quality Parameters for the Northeast Potentially Impacted Area
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Sampled																Mean	Standard Deviation
		SMDWNE-01	SMDWNE-02	SMDWNE-03	SMDWNE-04	SMDWNE-05	SMDWNE-06	SMDWNE-07	SMDWNE-08	SMDWNE-09	SMDWNE-10	SMDWNE-11	SMDWNE-12	SMDWNE-13	SMDWNE-14	SMDWNE-15	SMDWNE-16		
		10/12/00	10/12/00	10/12/00	10/12/00	10/12/00	10/13/00	10/13/00	10/13/00	10/13/00	10/14/00	10/14/00	10/14/00	10/14/00	10/15/00	10/15/00	10/15/00		
pH	SU	6.42	6.35	6.03	5.66	5.99	5.96	5.8	6.26	5.92	6.52	6.59	6.3	6.78	6.94	6.42	6.44	6.27	0.36
Total Organic Carbon	mg/kg	46200	36700	69700	56200	40850	68950	60500	68750	68750	59600	68250	37850	37250	61950	55150	46700	55209.38	12531.24
Alkalinity, Total	mg/kg	267	233	255	286	101	169	194	203	185	169	161	143	195	254	180	164	197.44	49.86
Bicarbonate Alkalinity	mg/kg	267	233	255	286	101	169	194	203	185	169	161	143	195	254	180	164	197.44	49.86
Carbonate Alkalinity	mg/kg	U (9)	U (9)	U (9)	U (9)	U (8)	U (9)	U (9)	U (10)	U (9)	U (9)	U (10)	U (9)	U (9)	U (9)	U (10)	U (9)	NC	NC
Chloride	mg/kg	3.91	ND	13.5	18.6	6.4	13.3	5.43	7.51	8.4	7.14	10.7	3.12	5.15	10.5	6.82	5.47	8.40	4.21
Sulfate	mg/kg	4.51	4	47.2	153	6.58	11.8	13.7	9.44	10.3	6.3	12	6.35	8.96	7.12	7.98	6.33	19.72	36.94
Nitrate	mg/kg	ND	U (.02)	0.102	0.384	0.02	ND	0.04	ND	ND	0.031	ND	ND	0.04	ND	0.029	0.049	0.09	0.12
Nitrite	mg/kg	ND	ND	0.042	0.302	ND	ND	0.163	ND	ND	ND	ND	ND	0.045	ND	ND	ND	0.14	0.12
Nitrogen, Ammonia	mg/kg	14.9	7.17	9.68	22.8	ND	6.26	6.36	5.2	4.89	1.61	2.23	0.915	0.614	1.71	1.36	1.33	5.80	6.14
Phosphate-P	mg/kg	7.82	11.8	19.6	13.6	8.22	12.5	14	12.4	13.7	11.5	13.1	7.97	15.8	18.1	13.1	19.1	13.27	3.60
Phosphorus	mg/kg	342	460	594	436	335	403	557	458	426	419	472	369	512	284	362	653	442.63	99.23

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 21. General Surface Soil Quality Parameters for the Southwest Potentially Impacted Area
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Sampled																Mean	Standard Deviation
		SMDWSW-01	SMDWSW-02	SMDWSW-03	SMDWSW-04	SMDWSW-05	SMDWSW-06	SMDWSW-07	SMDWSW-08	SMDWSW-09	SMDWSW-10	SMDWSW-11	SMDWSW-12	SMDWSW-13	SMDWSW-14	SMDWSW-15	SMDWSW-16		
		10/13/2000	10/13/2000	10/13/2000	10/13/2000	10/13/2000	10/13/2000	10/14/2000	10/14/2000	10/14/2000	10/14/2000	10/14/2000	10/14/2000	10/14/2000	10/15/2000	10/15/2000	10/15/2000		
pH	SU	6.45	6.45	6.1	6.15	6.23	6.5	6.52	6.62	6.41	6.6	6.61	6.37	6.79	6.57	6.4	6.57	6.46	0.18
Total Organic Carbon	mg/kg	19600	19650	35750	28750	26900	23950	14650	22600	31350	29400	20750	63050	18100	20600	14700	33300	26443.75	11659.47
Alkalinity, Total	mg/kg	101	117	99.8	107	104	108	182	119	127	137	96.7	144	117	81.7	105	130	117.26	23.57
Bicarbonate Alkalinity	mg/kg	101	117	99.8	107	104	108	182	119	127	137	96.7	144	117	82	105	130	117.28	23.54
Carbonate Alkalinity	mg/kg	U (8)	U (8)	U (8)	U (8)	U (8)	U (8)	U (9)	U (8)	U (8)	U (8)	U (8)	U (9)	U (9)	U (8)	U (8)	U (8)	NC	NC
Chloride	mg/kg	1.23	2.73	2.74	2.2	2.6	2.12	3.82	2.21	2.57	2.54	1.47	7.56	1.33	1.53	2.69	2.44	2.61	1.47
Sulfate	mg/kg	6.67	6.47	8.63	5.97	6.95	6.13	7.49	17.8	6.48	8.7	5.39	7.78	5.48	6.55	6.33	9.44	7.64	2.95
Nitrate	mg/kg	0.062	ND	ND	0.03	0.024	0.053	ND	0.075	0.042	ND	0.034	ND	0.028	0.024	ND	0.02	0.04	0.02
Nitrite	mg/kg	0.086	ND	ND	ND	ND	0.031	ND	0.094	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.03
Nitrogen, Ammonia	mg/kg	0.518	0.119	0.128	0.222	ND	0.653	ND	1.29	0.203	ND	ND	0.215	ND	ND	ND	0.405	0.42	0.38
Phosphate-P	mg/kg	3.71	7.7	5.19	7.3	8.92	6.24	5.35	5.2	7.3	6.92	4.72	13.7	6.76	5.69	6.8	12.8	7.14	2.71
Phosphorus	mg/kg	351	321	307	329	375	364	283	327	335	400	393	456	367	353	351	462	360.88	48.81

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 22. General Suburface Soil Quality Parameters for the Northest Potentially Impacted Area
Midnite Mine Site
Wellpinit, WA

		Location and Date Sampled																	
		SSDWNE-01	SSDWNE-02	SSDWNE-03	SSDWNE-04	SSDWNE-05	SSDWNE-06	SSDWNE-07	SSDWNE-08	SSDWNE-09	SSDWNE-10	SSDWNE-11	SSDWNE-12	SSDWNE-13	SSDWNE-14	SSDWNE-15	SSDWNE-16		
Parameter	**Unit**	10/12/00	10/12/00	10/12/00	10/12/00	10/12/00	10/13/00	10/13/00	10/13/00	10/13/00	10/14/00	10/14/00	10/14/00	10/14/00	10/15/00	10/15/00	10/15/00	**Mean**	**Standard Deviation**
pH	SU	6.59	6.54	6.59	6.69	6.47	6.21	6.7	6.51	6.36	6.61	6.24	6.32	6.6	6.33	6.46	6.62	6.49	0.16
Total Organic Carbon	mg/kg	18800	21650	27700	25850	20700	19700	18050	18050	26550	24300	22700	14550	26000	20200	26000	30200	22563	4283.79
Cation Exchange Capacity	mEq/g	0.275	ND	ND	ND	0.487	ND	ND	ND	0.402	ND	ND	ND	0.418	ND	ND	ND	0.40	0.09
Calcium	mEq/100g	10.5	ND	ND	ND	9.45	ND	ND	ND	10.3	ND	ND	ND	16.8	ND	ND	ND	11.76	3.39
Magnesium	mEq/100g	1.67	ND	ND	ND	2.43	ND	ND	ND	2.06	ND	ND	ND	3.99	ND	ND	ND	2.54	1.02
Sodium	mEq/100g	0.037	ND	ND	ND	0.04	ND	ND	ND	0.042	ND	ND	ND	0.04	ND	ND	ND	0.04	0.00
Potassium	mEq/100g	0.985	ND	ND	ND	0.693	ND	ND	ND	0.86	ND	ND	ND	1.33	ND	ND	ND	0.97	0.27
Moisture Content	Percent	7.16	7.96	9.76	8.02	7.34	8.18	10.4	9.39	7.45	9.57	9.73	5.95	10.3	8.57	8.3	11.29	8.71	1.42

SU = standard units
mg/kg = milligrams per kilogram
mEq/g = milliequivalents per gram
U = non-detect at detection limit in parenthesis
ND = not determined

Table M 23. General Suburface Soil Quality Parameters for the Southwest Potentially Impacted Area
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Sampled																Mean	Standard Deviation
		SSDWSW-01	SSDWSW-02	SSDWSW-03	SSDWSW-04	SSDWSW-05	SSDWSW-06	SSDWSW-07	SSDWSW-08	SSDWSW-09	SSDWSW-10	SSDWSW-11	SSDWSW-12	SSDWSW-13	SSDWSW-14	SSDWSW-15	SSDWSW-16		
		10/13/00	10/13/00	10/13/00	10/13/00	10/13/00	10/13/00	10/14/00	10/14/00	10/14/00	10/14/00	10/14/00	10/14/00	10/14/00	10/15/00	10/15/00	10/15/00		
pH	SU	6.55	6.44	6.6	6.61	6.64	6.83	6.67	6.45	6.63	6.44	6.61	6.6	6.58	6.6	6.25	6.63	6.57	0.13
Total Organic Carbon	mg/kg	16800	14200	12850	13450	13100	10550	7830	13350	16150	12600	13000	12200	11900	11250	11000	13800	12752	2123.19
Cation Exchange Capacity	mEq/g	0.214	ND	ND	ND	0.383	ND	ND	ND	0.22	ND	ND	ND	0.182	ND	ND	ND	0.25	0.09
Calcium	mEq/100g	8.23	ND	ND	ND	9.09	ND	ND	ND	9.59	ND	ND	ND	8.15	ND	ND	ND	8.77	0.70
Magnesium	mEq/100g	1.96	ND	ND	ND	1.82	ND	ND	ND	2.07	ND	ND	ND	1.95	ND	ND	ND	1.95	0.10
Sodium	mEq/100g	0.072	ND	ND	ND	0.058	ND	ND	ND	0.069	ND	ND	ND	0.058	ND	ND	ND	0.06	0.01
Potassium	mEq/100g	0.566	ND	ND	ND	0.949	ND	ND	ND	0.829	ND	ND	ND	0.571	ND	ND	ND	0.73	0.19
Moisture Content	Percent	5.89	5.88	5.25	5.42	6.39	5.57	5.87	5.47	7.11	6.11	5.04	9.56	5.33	5.37	5.99	4.9	5.95	1.11

SU = standard units
mg/kg = milligrams per kilogram
mEq/g = milliequivalents per gram
U = non-detect at detection limit in parenthesis
ND = not determined

Table M 24. General Surface Soil Quality Parameters for the East Haul Road
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Sampled												Mean	Standard Deviation
		SMEHR-01	SMEHR-02	SMEHR-03	SMEHR-04	SMEHR-05	SMEHR-06	SMEHR-07	SMEHR-08	SMEHR-09	SMEHR-10	SMEHR-11	SMEHR-12		
		10/10/00	10/10/00	10/10/00	10/11/00	10/10/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00		
pH	SU	6.03	6.67	7.35	6.77	7.74	6.98	7.05	7.34	6.79	7.92	6.87	6.52	7.00	0.52
Total Organic Carbon	mg/kg	27650	34400	35200	36500	39650	40000	34350	49200	21100	8975	20100	29300	31368.75	10754.01
Alkalinity, Total	mg/kg	75.6	113	328	343	113	232	239	635	172	300	282	165	249.80	150.21
Bicarbonate Alkalinity	mg/kg	75.6	113	328	343	112	232	239	625	172	285	282	165	247.63	147.56
Carbonate Alkalinity	mg/kg	U (9)	U (9)	U (9)	U (9)	U (9)	U (9)	U (9)	10	U (8)	14.4	U (9)	U (9)	12.20	3.11
Chloride	mg/kg	4.04	3.99	4.7	6.03	2.82	2.8	2.39	2.8	2.96	3.23	3.34	2.76	3.49	1.04
Sulfate	mg/kg	770	9.19	32.6	11.5	1401	8.25	8.56	26.6	5.08	235	6.32	3.6	209.81	435.36
Nitrate	mg/kg	0.117	0.123	0.528	0.022	0.205	0.121	ND	ND	ND	0.054	ND	ND	0.17	0.17
Nitrite	mg/kg	U (.02)	U (.02)	0.169	ND	0.059	0.066	ND	ND	ND	0.061	ND	ND	0.09	0.05
Nitrogen, Ammonia	mg/kg	2.53	3.92	1.46	9.18	U (.1)	10	10.4	18.5	2.38	U (.1)	7.14	6.74	7.23	5.15
Phosphate-P	mg/kg	2.44	5.3	7.97	14.2	0.476	3.82	7.75	6.03	3.25	1.78	4.65	7.28	5.41	3.66
Phosphorus	mg/kg	422	401	375	417	397	409	325	444	217	241	382	361	365.92	71.18

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
ND = not determined

Table M 25. General Surface Soil Quality Parameters for the West Haul Road
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Time Sampled				Mean	Standard Deviation
		SMWHR-01	SMWHR-02	SMWHR-03	SMWHR-04		
		10/12/2000	10/12/2000	10/12/2000	10/11/2000		
pH	SU	8.14	7.01	6.79	7.2	7.29	0.59
Total Organic Carbon	mg/kg	33900	16950	19850	46150	29212.50	13501.57
Alkalinity, Total	mg/kg	261	210	223	644	334.50	207.46
Bicarbonate Alkalinity	mg/kg	248	204	216	644	328.00	211.48
Carbonate Alkalinity	mg/kg	12.5	U (9)	U (9)	U (9)	12.50	NC
Chloride	mg/kg	280	1.07	1.4	5.92	72.10	138.62
Sulfate	mg/kg	142	2.25	2.46	15.5	40.55	67.92
Nitrate	mg/kg	0.543	0.023	ND	ND	0.28	0.37
Nitrogen, Ammonia	mg/kg	U (.1)	U (.1)	1.52	6.47	4.00	3.50
Phosphate-P	mg/kg	0.354	4.85	3.11	6.77	3.77	2.72
Phosphorus	mg/kg	288	338	287	409	330.50	57.49

SU = standard units
mg/kg = milligrams per kilogram
U = non-detect at detection limit in parenthesis
NC = not calculated
ND = not determined

Table M 26. General Suburface Soil Quality Parameters for the East Haul Road
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Sampled										Mean	Standard Deviation
		SSEHR-01	SSEHR-02	SSEHR-03	SSEHR-04	SSEHR-06	SSEHR-07	SSEHR-08	SSEHR-09	SSEHR-11	SSEHR-12		
		10/10/00	10/10/00	10/10/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00		
pH	SU	4.8	6.4	7.19	6.53	6.47	6.76	7.44	6.7	6.45	6.65	6.54	0.70
Total Organic Carbon	mg/kg	14750	13600	17000	15700	19700	16250	18600	10950	10150	15600	15230.00	3034.63
Cation Exchange Capacity	mEq/g	0.221	ND	ND	ND	ND	ND	0.173	0.147	ND	ND	0.18	0.04
Calcium	mEq/100g	9.31	ND	ND	ND	ND	ND	18.3	8.38	ND	ND	12.00	5.48
Magnesium	mEq/100g	2.86	ND	ND	ND	ND	ND	1.35	1.71	ND	ND	1.97	0.79
Sodium	mEq/100g	0.043	ND	ND	ND	ND	ND	0.084	0.072	ND	ND	0.07	0.02
Potassium	mEq/100g	0.485	ND	ND	ND	ND	ND	0.593	0.478	ND	ND	0.52	0.06
Moisture Content	Percent	7.23	8.22	5.66	6.19	6.97	8.29	9.24	5.15	6.87	6.07	6.99	1.29

SU = standard units
mg/kg = milligrams per kilogram
mEq/g = milliequivalent per gram
ND = not determined

Table M 27. General Suburface Soil Quality Parameters for the West Haul Road
Midnite Mine Site
Wellpinit, WA

Parameter	Unit	Location and Date Sampled			Mean	Standard Deviation
		SSWHR-02	SSWHR-03	SSWHR-04		
		10/12/00	10/12/00	10/11/00		
pH	SU	6.94	6.77	7.5	7.07	0.38
Total Organic Carbon	mg/kg	14650	11750	13800	13400	1490.81
Moisture Content	Percent	4.69	4.67	5.81	5.06	0.38

SU = standard units
mg/kg = milligrams per kilogram

Appendix N - Plant and Invertebrate Tissue Analyses
Midnite Mine Site
Wellpinit, Washington

Table N1 : Terrestrial Invertebrate Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Mined Area								PIA	
	US1					US2		US3	US4	OVERALL
Analyte	(comp. of 3 plots)	(comp. of 3 plots: dup)	(plot 2)	(plot 3)	(plot 6)	(comp. of 5 plots)	(plot 1)	(comp. of 6 plots)	(comp. of 6 plots)	MAX*
Aluminum	168	214	414	174	140	68	87	126	78	414
Arsenic	0.7	0.8	2.1	0.25	0.6	0.25	0.6	0.5	1	2.1
Barium	5.9	6.5	7.1	5.3	8.2	2.9	3.7	8.5	16.7	16.7
Beryllium	0.025	0.025	0.05	0.025	0.025	0.025	0.025	0.05	0.1	0.1
Cadmium	0.2	0.2	0.3	0.2	0.3	1.3	0.3	0.7	0.9	1.3
Chromium	1.1	1.2	2.2	1.1	1.2	1	1	0.9	1	2.2
Cobalt	0.42	0.45	1.26	0.41	0.27	0.24	0.32	0.3	0.1	1.26
Copper	56.8	64.5	65.9	69.1	59.8	50.5	59.2	41	42	69.1
Iron	342	380	806	304	246	221	203	240	176	806
Lead	2	2	2	2	2	2	2	2	3.5	3.5
Manganese	50.4	49.4	74.5	56	43.8	95.8	41.8	36.5	108	108
Nickel	0.5	1	2	2	1	2	0.5	2	1	2
Selenium	0.1	0.2	0.2	0.2	0.1	0.1	0.002	0.2	0.3	0.3
Silver	0.05	0.06	0.09	0.06	0.23	0.05	0.025	0.05	0.1	0.23
Thallium	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.05	0.1	0.1
Uranium, elemental	2.1	2.32	7.52	1.85	0.77	1.56	0.89	0.35	1.75	7.52
Uranium, calculated	NA	NA	NA	NA	NA	NA	NA	0.670	1.03	1.03
Zinc	136	141	118	145	136	148	135	129	152	152

*Values used in food chain models.
mg/kg: Milligram per kilogram
PIA: Potentially Impacted Area
Max.: Maximum
Comp.: Composite
Dup.: Duplicate
NA .: Not Applicable

Table N2 : Riparian Invertebrate Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Upper Blue Creek			Middle Blue Creek		Central Drainage		Eastern Drainage	Western Drainage
Analyte	BU1 (composite)	BU2 (composite)	BU3 (composite)	BD1 (composite)	BD2/3 (composite)	C1 (composite)	C2 (composite)	E1/E2 (composite)	W1/W2 (composite)
Aluminum	27	36	19	20	48	24	44	29	66
Arsenic	0.4	0.5	0.35	0.5	0.25	0.5	0.25	0.3	0.5
Barium	17.9	7.1	8.3	3.1	5.6	5.3	5.2	4.3	8.7
Beryllium	0.04	0.05	0.035	0.05	0.025	0.02	0.025	0.03	0.025
Cadmium	0.7	2.9	1.4	3.3	4.1	1.93	4.5	2.8	3.84
Chromium	1.3	3.4	1.3	1.7	1.4	0.86	0.8	1.1	1.18
Cobalt	0.08	0.3	0.035	0.05	0.1	0.12	0.17	0.06	0.14
Copper	39.7	110	63	58	42.8	57.2	57.7	28.4	67.8
Iron	131	148	144	189	173	126	147	105	208
Lead	4	5	3.5	5	5	4	2.5	3	4.5
Manganese	103	59	81.1	96	101	184	213	91.7	106
Nickel	1	1.5	1	1.5	1	1	0.5	0.5	1
Selenium	0.3	0.4	0.3	0.4	0.4	0.2	0.2	0.4	0.5
Silver	0.23	0.4	0.13	0.05	4.92	0.24	0.21	0.12	0.59
Thallium	0.04	0.05	0.035	0.05	0.025	0.02	0.025	0.03	0.025
Uranium	0.04	0.4	0.035	0.05	0.15	0.3	1.81	0.12	1.54
Zinc	137	133	151	226	184	185	221	170	205

mg/kg: Milligram per kilogram

Table N3 : Aquatic Invertebrate Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Upper Blue Creek					Middle Blue Creek				Eastern Drainage	Western Drainage		
Analyte	BU1 (composite)	BU2 (composite)	BU3 (composite)	BU3 (DUP) (composite)	MAX VALUE*	BD1 (composite)	BD2 (composite)	BD3 (composite)	MAX VALUE*	E1/E2 (composite)*	W1 (composite)	W2 (composite)	MAX VALUE*
Aluminum	1490	1880	1030	1270	1880	1240	2060	2010	2060	2330	332	173	332
Arsenic	1	1.5	1	1.1	1.5	2	1.5	2	2	4.7	0.25	0.25	0.25
Barium	79	147	137	134	147	31.7	38.5	33.8	38.5	43	2.2	1.9	2.2
Beryllium	0.1	0.15	0.1	0.11	0.15	0.65	0.85	0.8	0.85	0.52	0.41	0.025	0.41
Cadmium	0.6	0.6	0.5	0.5	0.6	1.8	2	2.3	2.3	8.5	2	0.5	2
Chromium	2.3	2.6	3.6	4.5	4.5	3.2	3.1	3.5	3.5	6.9	1.1	0.6	1.1
Cobalt	2.05	2.6	2.91	2.97	2.97	2.05	2.3	2.1	2.3	9.69	0.46	0.025	0.46
Copper	30	30	31.7	35.6	35.6	20	15	16	20	15.5	37.2	17.5	37.2
Iron	1820	2510	1810	2000	2510	2020	1990	1830	2020	3180	182	303	303
Lead	2	2	2	2	2	2	2	2	2	5	5	5	5
Manganese	364	488	794	797	797	2280	4120	3530	4120	1640	688	284	688
Nickel	3	3	5	5	5	14	18	19	19	18	5	3	5
Selenium	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	7.8	0.6	0.25	0.6
Silver	0.25	0.3	0.42	0.43	0.43	0.25	0.2	0.15	0.25	0.78	0.88	0.05	0.88
Thallium	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.025	0.025	0.025
Uranium	7.6	9.1	7.75	7.94	9.1	25.7	23.9	30.8	30.8	20.8	35.9	0.3	35.9
Zinc	160	186	106	114	186	124	170	151	170	132	183	148	183

*Values used in food chain models.
mg/kg: Milligram per kilogram
Max: Maximum

Table N4 : Terrestrial Above-Ground Vegetation Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Mined Area:									PIA:			
	US1 (N=6**)			US2 (N=6)			US3 (N=6)			US4 (N=6)			OVERALL
Analyte	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	MAX*
Aluminum	30	130	230	130	238	510	250	345	470	260	310	360	510
Arsenic	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.5	4	0.5	0.5	0.5	4
Barium	17	25.25	37.5	6	12.3	18	19	53.33	99	27	93.67	195	195
Beryllium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium	0.1	0.1	0.1	0.1	0.533	2.1	0.1	0.15	0.4	0.1	0.117	0.2	2.1
Chromium	0.4	0.517	0.7	0.3	0.467	0.7	0.4	0.483	0.6	0.3	0.383	0.4	0.7
Cobalt	0.05	0.0958	0.2	0.05	0.158	0.3	0.1	0.167	0.3	0.05	0.0917	0.2	0.3
Copper	2	2.67	4	2	3.17	4	3	3.83	5	3	3.33	4	5
Iron	70	105	140	90	147	300	130	198	290	150	178	200	300
Lead	0.1	0.133	0.3	0.1	0.2	0.5	0.1	0.15	0.2	0.1	0.133	0.3	0.5
Manganese	40	99.17	170	30	165	610	130	182	260	170	215	270	610
Nickel	0.5	0.5	0.5	0.01	1.09	5	0.5	0.5	0.5	0.5	0.5	0.5	5
Selenium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.167	0.5	0.05	0.075	0.2	0.5
Thallium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Uranium, calculated	0.794	1.30	2.13	0.374	1.68	4.38	0.157	0.379	0.739	0.000028	0.270	0.810	4.38
Zinc	10	11.92	16	0.1	15.9	40	25	28	31	29	32.83	40	40

*Values used in food chain models.
**N for calculated Uranium is 5
N: Sample Size
mg/kg: Milligram per kilogram
PIA: Potentially Impacted Area
Max: Maximum
Min: Minimum

Table N5 : Terrestrial Root Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Mined Area									PIA			
	US1 (N=6)			US2 (N=6)			US3 (N=6)			US4 (N=6**)			OVERALL
Analyte	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	MAX*
Aluminum	16800	22160	28600	17000	23500	29600	9430	12572	17400	16100	21267	26200	29600
Arsenic	3	4.92	8	5	11.8	19	2	3.33	5	1	2.67	5	19
Barium	140	180.1	210	100	170	280	130	223	280	266	419	609	609
Beryllium	0.2	0.45	0.8	0.8	1.28	2.1	0.3	0.4	0.6	0.4	0.617	0.8	2.1
Cadmium	0.1	0.458	0.7	0.4	1.55	4	0.4	0.667	1.4	0.4	0.6	0.7	4
Chromium	4.4	6.82	8.3	5	11.1	16	4.1	5.52	6.7	5.2	6.47	7.5	16
Cobalt	3.1	4.675	6.6	5.5	8.23	15	5.2	6.53	7.5	3.6	5.08	6.3	15
Copper	35	43.4	56	41	82.5	116	46	63	84	45	54.5	84	116
Iron	7675	11455	14900	10100	13167	16600	5150	6978	8970	7630	9645	12200	16600
Lead	6	9.28	13.4	13.2	25.85	37	16.9	25.8	37.9	16.6	24.3	29.6	37.9
Manganese	230	647	940	660	927	1420	350	760	1300	640	767	990	1420
Nickel	8	11.5	16	11	19.3	26	8	9.33	10	5	7.67	10	26
Selenium	0.1	0.133	0.3	0.05	0.208	0.5	0.05	0.117	0.2	0.05	0.09167	0.2	0.5
Silver	0.05	0.225	0.5	0.05	0.358	0.9	0.05	0.85	3.9	0.05	0.175	0.4	3.9
Thallium	0.05	0.075	0.2	0.05	0.208	0.4	0.05	0.05	0.05	0.05	0.1	0.2	0.4
Uranium, calculated	2.31	88.0	166	6.90	295	876	3.60	23.0	51.5	11.1	18.0	28.4	876.1
Zinc	32	67.6	104.5	43	89.8	147	44	61.5	82	48	61.2	81	147

*Values used in food chain models.
**N for calculated Uranium is 5
mg/kg: Milligram per kilogram
PIA: Potentially Impacted Area
Max: Maximum
N: Sample Size

Table N6 : Riparian Above-Ground Vegetation Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Upper Blue Creek									Middle Blue Creek									Central Drainage						Eastern Drainage						Western Drainage					
	BU1 (N=6)			BU2 (N=6)			BU3 (N=6)			BD1 (N=6)			BD2 (N=6)			BD3 (N=6)			C1 (N=6)			C2 (N=6)			ED1 (N=6)			ED2 (N=6)			WD1 (N=6)			WD2 (N=6)		
Analyte	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Aluminum	440	965	2500	170	438	970	280	825	2240	120	388	710	110	228	290	120	233	380	190	398	1210	140	192	350	210	482	1080	210	388	710	105	556	1370	230	322	410
Arsenic	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.08	4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Barium	68	92	138	43	66.7	82	56	79.2	109	3	10.3	15	8	14.2	22	7	12.3	28	15	28.8	36	10	18.1	30	29	37.7	54	3	20.7	41	14.5	26.25	43	27	55.8	92
Beryllium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.125	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.0917	0.3	0.05	0.05	0.05
Cadmium	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.25	0.7	1.7	2.49	4.45	0.4	1.23	2.4	0.1	1.55	3.5	0.1	0.533	1.5	0.3	0.85	1.6	0.1	0.267	0.9	0.1	2.15	6.6	0.7	1.575	3.8	0.1	0.667	1.7
Chromium	0.7	1	1.4	0.7	0.783	0.9	0.6	0.65	0.8	0.4	0.608	0.8	0.4	0.467	0.5	0.3	0.417	0.6	0.4	0.667	1.7	0.5	0.658	0.8	0.5	0.717	1	0.3	0.567	0.8	0.5	1.025	2.7	0.6	0.7	0.8
Cobalt	0.2	0.317	0.5	0.2	0.2	0.2	0.2	0.233	0.3	0.2	0.233	0.3	0.1	0.183	0.2	0.2	0.217	0.3	0.05	1.21	3.6	0.05	0.25	0.8	0.2	0.317	0.5	0.2	0.233	0.3	0.2	0.342	0.6	0.05	0.142	0.3
Copper	6	6.33	7	4	5.67	7	6	7.83	11	5	6.17	8	4	6.17	8	6	7	9	3	3.67	5	3	5	11	5	8.5	12	3	6	8	5	8.5	11	4	7.67	11
Iron	270	477	1010	130	292	530	200	370	630	110	214	350	90	138	170	80	145	240	100	945	5040	90	137.5	220	140	295	590	130	233	400	65	299	590	190	240	290
Lead	0.1	0.233	0.6	0.1	0.117	0.2	0.1	0.317	0.5	0.1	0.133	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	5.37	19	0.1	0.1	0.1	0.1	0.183	0.3	0.1	0.1	0.1	0.1	0.317	0.6	0.1	0.1	0.1
Manganese	140	192	240	60	167	250	100	192	340	130	212	290	80	155	260	120	172	210	130	400	860	300	745	1690	60	170	290	100	257	430	450	1024	1600	170	673	1430
Nickel	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.583	1	2	2.17	3	1	1.83	3	2	2.5	3	0.5	3.58	7	3	8.58	31	0.5	0.75	1	1	2	3	3.5	5.58	7	0.01	3.00	5
Selenium	0.1	0.15	0.2	0.05	0.1	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.075	0.1	0.05	0.05	0.05	0.05	0.0583	0.1	0.05	0.05	0.05	0.05	0.108	0.3	0.05	0.05	0.05	0.05	0.05	0.05
Silver	0.05	0.05	0.05	0.05	0.075	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.55	2.6	0.05	0.117	0.3	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.342	1.8	0.05	0.0542	0.075	0.05	0.0583	0.1
Thallium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Uranium, calculated	0.538	0.925	1.68	0.150	0.371	0.614	0.0900	0.527	0.995	0.0901	0.363	0.958	0	0.354	1.04	0	0.417	0.789	0.314	16.7	90.6	1.05	6.11	25.9	0.660	0.827	1.23	0.000057	0.373	0.559	1.79	10.4	28.6	0.0600	0.665	1.87
Zinc	23	27.8	32	17	25.3	31	19	22.2	29	27	31.9	42	21	34.3	41	29	37.2	46	23	47.8	83	20	42.7	106	15	22.5	28	22	36.2	43	28	46.6	67	0.25	29.2	47

mg/kg: Milligram per kilogram
Max: Maximum
Min: Minimum
N: Sample Size

Table N7 : Riparian Root Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Upper Blue Creek									Middle Blue Creek								
	BU1 (N=6)			BU2 (N=6)			BU3 (N=6)			BD1 (N=6)			BD2 (N=6)			BD3 (N=6)		
Analyte	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Aluminum	2140	4190	8530	1770	2337	3370	1540	3375	4660	1580	2912.5	4030	2630	3365	4620	2280	3672	6300
Arsenic	1.5	3	9	0.5	3.17	9	0.5	2.08	5	0.5	2.17	5	1.5	2.75	4	1	4.17	8
Barium	101	151	263	102	125	159	81	119	149	38	66.8	122	75	89.3	103	45.7	81.95	131
Beryllium	0.15	0.5	0.9	0.3	0.417	0.6	0.3	0.533	0.7	0.1	0.658	1.1	0.5	0.917	1.3	0.5	1.37	4.6
Cadmium	0.2	1.55	3.7	0.2	0.433	0.7	0.4	0.733	1.6	0.4	2.62	6.3	0.8	3.83	6	0.7	3.57	10.1
Chromium	2.9	3.45	4.2	1.8	2.32	3.2	1.7	3.02	4.7	1.4	2.53	4.3	2	2.95	3.5	1.9	2.98	4.4
Cobalt	2	2.63	4.7	1.6	2.27	2.7	1.4	2.48	4.4	2.2	4.85	10.3	3.1	11.3	19.1	3.1	19.5	63.9
Copper	29	45.7	78	30	52	86	26	39.3	51	14	37.2	65	32	53.3	85	37	62.2	107
Iron	4480	9748	22800	4110	6047	12400	2530	5813	11800	1480	3651	6110	3160	4210	5620	3000	6075	10600
Lead	2.4	18.6	76.9	3.1	4	6.1	1.9	5.85	12.3	2.3	3.76	8.6	3	4.72	5.9	4.3	6.7	9.6
Manganese	182	245	423	182	309	537	174	266	390	349	1372	3890	296	3146	6780	546	1278	2460
Nickel	3	5.5	10	3	4.5	6	1.5	4.17	6	7	24.1	51	9	66.7	122	9	45.5	130
Selenium	0.2	0.417	1	0.1	0.267	0.4	0.1	0.167	0.25	0.05	0.233	0.4	0.25	0.317	0.45	0.1	0.3	0.5
Silver	0.1	1.21	6.5	0.05	0.217	0.5	0.05	0.217	0.5	0.075	0.879	4.2	0.1	0.417	0.9	0.1	0.358	0.8
Thallium	0.1	0.15	0.2	0.05	0.0917	0.15	0.05	0.075	0.1	0.05	0.0583	0.1	0.1	0.158	0.25	0.05	0.125	0.2
Uranium, calculated	9.00	19.6	33.4	15.3	28.7	78.4	5.44	14.5	27.5	39.1	174	574	118	232	452	48.28	234	663
Zinc	29	33.7	40	20	44.3	95	33	41	50	41	78.25	144	50	146	203	37	113	280

	Central Drainage						Eastern Drainage						Western Drainage					
	C1 (N=6**)			C2 (N=6)			ED1 (N=6)			ED2 (N=6)			WD1 (N=6**)			WD2 (N=6)		
Analyte	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Aluminum	9690	21782	41100	15500	19317	24700	1600	2045	2710	2380	4812	6660	4550	17325	31700	1960	3376	5360
Arsenic	1	7	19	8	11.2	14	1	3.58	8	1.75	3.125	6	2	6.17	9	1	2.42	6
Barium	200	273	360	150	204	240	79	95.7	109	114	176	265	122	195	220	40.4	144	360
Beryllium	0.3	2.9	8	3.1	4.5	6.6	0.1	0.242	0.5	0.5	0.9	1.7	0.7	2.23	4.4	0.3	0.85	1.6
Cadmium	0.3	4.75	11.4	6.4	8.15	11	0.2	0.85	1.4	1.5	2.625	5.9	0.6	3.02	10.4	0.6	0.983	2.1
Chromium	3	6.77	14.3	5.2	6.34	8.1	2.7	3.82	7.3	3	5.6	9.7	2.7	7.13	10.2	1.1	2.6	4.8
Cobalt	4.3	73.35	197	52.9	90.25	137	1.5	3.65	9.7	3.2	5.3	11	3.5	19.1	36.2	2.4	5.66	11
Copper	32	103	210	91	127	157	25	45.8	77	52	75.25	131	41	109	216	18	43.1	71
Iron	4070	9482	16400	6860	9456	11100	1760	3255	6170	3610	5854	7090	4550	10632	15200	1830	3940	6920
Lead	6.9	17.4	30.7	14.9	23.6	30.4	2.4	4.28	7.7	16.1	26.1	34	11	32.2	51.2	2	5.55	11.4
Manganese	450	3880	8600	7530	13905	21800	77	224.5	528	900	2120	4840	1080	2897	5460	355	739	1490
Nickel	5	118	278	146	226	305	2.5	10.6	43	5	26.3	70	18	59	103	3	18.6	37
Selenium	0.05	0.133	0.2	0.2	0.233	0.3	0.2	0.317	0.45	0.3	0.717	1.2	0.05	0.317	0.9	0.1	0.3	0.8
Silver	0.1	0.192	0.3	0.2	0.233	0.3	0.1	0.6	2.5	0.2	0.467	1.2	0.2	0.433	1	0.2	1.28	5.1
Thallium	0.05	0.133	0.3	0.2	0.267	0.3	0.1	0.183	0.25	0.05	0.1	0.2	0.05	0.158	0.2	0.05	0.0833	0.1
Uranium, calculated	45.6	276	664	6230	7675	11900	15.1	36.0	72.2	1.386	81.4	169	78.7	288	392	33.3	171	302
Zinc	48	247	580	161	205	275	17	35.5	51	51	72.2	120	43	131.5	307	45	65.2	110

**N for calculated Uranium is 3
mg/kg: Milligram per kilogram
Max: Maximum
Min: Minimum

Table N8 : Aquatic Plant Tissue Concentrations (mg/kg)
Midnite Mine Site
Wellpinit, WA

	Upper Blue Creek							Middle Blue Creek						Eastern Drainage				Western Drainage			
Analyte	BU1 (composite)	BU1 (DUP) (composite)	BU2/BU1 (composite)	BU2 (composite)	BU2/BU3 (composite)	BU3 (composite)	MAX VALUE*	BD1 (composite)	BD1/BD2 (composite)	BD2 (composite)	BD2/BD3 (composite)	BD3 (composite)	MAX VALUE*	E1 (composite)	E1/E2 (composite)	E2 (composite)	MAX VALUE*	W1 (composite)	W1/W2 (composite)	W2 (composite)	MAX VALUE*
Aluminum	10600	10500	7710	18100	6010	34500	34500	15500	11800	26800	15200	12600	26800	5710	4440	5620	5710	25300	15300	14000	25300
Arsenic	2	2	1	1	0.5	4	4	8	5	8	4	3	8	2	2	3	3	5	2	3	5
Barium	206	217	229	209	120	463	463	140	100	250	150	152	250	53	50	75	75	74	70	58	74
Beryllium	0.4	0.4	0.1	0.4	0.3	0.5	0.5	4.3	2.7	4.8	4.8	4.8	4.8	2.9	1	3	3	10.3	12.7	8.8	12.7
Cadmium	0.1	0.3	0.1	0.1	0.1	0.2	0.3	12.9	1.9	5.2	4.1	4.9	12.9	1.8	1.4	3.8	3.8	0.8	1.5	1	1.5
Chromium	11.9	8.7	8.9	6.8	1.9	5.6	11.9	11.6	10.7	16.2	7.3	4.4	16.2	8	6.3	9.3	9.3	7.2	2	4.1	7.2
Cobalt	4.9	5.2	2.8	2	1.9	3.8	5.2	8.6	4.7	11.3	6.5	8.6	11.3	10.3	4.7	8.3	10.3	4.5	27.8	8.3	27.8
Copper	8	9	9	9	11	32	32	36	10	13	15	15	36	30	15	17	30	73	36	36	73
Iron	7960	8990	5530	7220	4140	21000	21000	11500	5260	15900	7570	6230	15900	3560	2270	3400	3560	6000	4060	6410	6410
Lead	2.2	2.3	1	2.3	1.6	4.5	4.5	4.1	1.7	3.6	2	2.2	4.1	2.8	2.8	2.5	2.8	3.9	1.7	1.7	3.9
Manganese	2060	2180	870	890	830	3560	3560	15400	16900	38800	32900	25900	38800	4170	1410	8820	8820	2520	17200	6820	17200
Nickel	9	8	6	7	4	7	9	75	44	140	100	109	140	16	10	66	66	28	71	55	71
Selenium	0.2	0.2	0.05	0.05	0.05	0.3	0.3	0.5	0.3	0.5	0.5	0.4	0.5	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.3
Silver	0.2	0.05	0.05	0.1	0.1	0.05	0.2	0.1	0.5	0.05	0.1	0.1	0.5	0.05	0.05	0.1	0.1	3.6	0.2	0.3	3.6
Thallium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.3	0.05	0.2	0.05	0.1	0.3	0.05	0.1	0.2	0.2	0.05	0.05	0.05	0.05
Uranium, calculated	18.1	22.1	8.15	16.3	10.9	23.3	23.33	109	48.6	103	72.5	72.4	108.7	93.6	87.4	121	121.0	845	1027	1177	1177
Zinc	40	41	35	34	35	45	45	340	113	250	200	208	340	101	41	163	163	77	115	108	115

*Values used in food chain models.
mg/kg: Milligram per kilogram
Max: Maximum

Appendix O - Site-specific Aquatic Studies
Midnite Mine Site
Wellpinit, Washington

DATA SUMMARY REPORT
for
MIDNITE MINE SITE
SITE-SPECIFIC AQUATIC STUDIES
WELLPINIT, WASHINGTON

February 18, 2004

0081-DFR-093005

DATA SUMMARY REPORT
ON
SITE-SPECIFIC AQUATIC STUDIES
MIDNITE MINE SITE
WELLPINIT, WA

U.S. EPA Work Assignment No.: 0-266
Lockheed Martin Work Order No.: R1A00266
U.S. EPA Contract No.: 68-C99-223

Prepared For:
United States Environmental Protection Agency (U.S. EPA)/
Environmental Response Team Center (ERTC)
Edison, NJ

February 18, 2004

Prepared by:		Prepared for:
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0081-DFR-093005

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LIST OF ACRONYMS AND ABBREVIATIONS

As	arsenic
Ba	barium
BC	Blue Creek
Be	beryllium
Ca	calcium
Cd	cadmium
cfs	cubic feet per second
cm	centimeter
Co	cobalt
COPC	contaminant of potential concern
Cu	copper
°C	degrees Celsius
DMC	Dawn Mining Company
DO	dissolved oxygen
DOC	dissolved organic carbon
ED	Eastern Drainage
EPT	Ephemeroptera/Plecoptera/Tricoptera
ERA	ecological risk assessment
FDR Lake	Franklin D. Roosevelt Lake
ft	feet
ft/mile	feet per mile
GPS	global positioning system
K	potassium
km	kilometer
m	meter
Mg	magnesium
MDL	method detection limit
Mn	manganese
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
mm	millimeter
Na	sodium
Ni	nickel
NPL	National Priorities List
NTU	nephelometric turbidity units
Pb	lead
pCi/g	pico Curies per gram
pCi/L	pico Curies per liter
QA/QC	quality assurance/quality control
Ra	radium
RBP	rapid bioassessment protocols
REAC	Response, Engineering, and Analytical Contract
Ref	Reference

RI/FS	Remedial Investigation/Feasibility Study

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

Sb	antimony
SOP	standard operating procedure
std units	standard units
TAL	target analyte list
TOC	total organic carbon
U.S. DOT	United States Department of Transportation
U.S. EPA	United States Environmental Protection Agency
U	uranium
µg/L	microgram per liter
µm	micron
µS/cm	microseimens per centimeter
V	vanadium
Zn	zinc
%	percent

1.0 INTRODUCTION

1.1 Objective

The objective of the site-specific aquatic studies was to support the aquatic ecological risk assessment (ERA) for the Midnite Mine Site remedial investigation/feasibility study (RI/FS) by:

- Addressing some of the uncertainties that will be defined in the ERA for the Midnite Mine Site RI/FS related to the aquatic habitats and communities of Blue Creek,
- Providing current data on the aquatic habitats and macroinvertebrate communities associated with the Eastern Drainage and Blue Creek,
- Assessing the potential impact of the releases from the Eastern Drainage to Blue Creek;
- Assessing the toxicity of sediments in Blue Creek and the Eastern Drainage and,
- Assessing bioaccumulation of contaminants of potential concern (COPCs) by the macroinvertebrate community.

1.2 Site Background

Midnite Mine is an inactive open pit uranium (U) mine located on the Spokane Indian Reservation in Washington State. Wellpinit, the nearest town, is approximately eight miles southeast of the site. Mining activities, conducted by Dawn Mining Company (DMC) between 1955 and 1981, resulted in releases of radionuclides and other metals to the environment. The site was added to the National Priorities List (NPL) in May 2000. The site is situated on the south-facing slope of Spokane Mountain at elevations ranging from approximately 2,400 to 3,400 feet (ft) above sea level. During mining operations, an area approximately 0.5 mile wide by one mile long was developed, and several pits and subpits were excavated. Overburden and waste rock were used to backfill some of the pits and altered the surface terrain, filling portions of the natural drainages and creating several large piles (URS 2002).

The site is in the Blue Creek watershed. Blue Creek originates at Turtle Lake and flows southwest approximately 6.7 miles to Franklin D. Roosevelt Lake (FDR Lake), approximately three miles from the East Drainage confluence. Blue Creek drainage has a surface area of 19.6 square miles. Streambed elevation ranges from 2,450 ft at Turtle Lake to 1,290 ft at FDR Lake, yielding an average drop in elevation of 179 feet per mile (ft/mile). Oyachen Creek converges with Blue Creek approximately 1.5 miles downstream of the confluence of Blue Creek and the Eastern Drainage.

2.0 METHODOLOGY

The Sampling and Analysis Plan (Lockheed Martin/REAC 2003) was followed, with the following exceptions. One deviation was an approved modification to the work plan which changed the reference station from Sand Creek to Rail Creek at the recommendation of the Spokane Tribe of Indians.

This sampling regime was to be conducted before the water treatment facility was operating and releasing treated water to the Eastern Drainage, and subsequent to several months of low flow, when concentrations of metals and dissolved solids would be expected to be elevated. The weekend prior to sampling there was a storm event that resulted in high stream flows in Blue Creek. Additionally, sediment toxicity studies did not produce defensible results, even after several repeated tests the laboratory was unable to meet the appropriate laboratory performance standards. Subsequently, these tests will not be included in this report.

2.1 Sampling Locations

Sampling was conducted during the week of March 18, 2003. Sampling was carried out prior to the Spring start-up of the onsite water treatment facility. The study area included six sampling locations in Blue Creek, one location in the Eastern Drainage, and one reference location on Rail Creek. All locations were established and recorded with a Trimble Global Position System (GPS) unit. The exact spot for each location was chosen in the field (Figure 1). The locations were designated as follows:

- BC-1, Upper Blue Creek location approximately 1,000 meters (m) upstream of the confluence with the Eastern Drainage,
- BC-2, Upper Blue Creek location approximately 250 m upstream of the confluence with the Eastern Drainage,
- BC-3, Middle Blue Creek location approximately 250 m below the confluence with the Eastern Drainage,
- BC-4, Middle Blue Creek location approximately 1,500 m downstream of the confluence with the Eastern Drainage,
- BC-5, Lower Blue Creek location approximately 100 m below the confluence with Oyachen Creek,
- BC-6, Lower Blue Creek location approximately 1,500 m downstream of the confluence with Oyachen Creek,
- ED-1, Eastern Drainage location approximately 200 m upstream of the confluence with Blue Creek,
- REF-1, Rail Creek reference location was situated approximately 29 kilometers (km) from the site (not shown in Figure 1).

2.2 Habitat Analysis

A habitat assessment matrix based on stream classification guidelines and methods for evaluating riparian and biotic conditions was used to support the biological survey (U.S. EPA 1999). Habitat parameters were evaluated at all sampling locations and placed into categories. Primary categories are those that characterize the stream microscale habitat and have the greatest influence on the structure of the biological community, including characterization of the bottom substrate and available cover, estimation of embeddedness, and estimation of flow or velocity and depth regime. Secondary categories measure the macroscale habitat, including channel morphology, channel alteration, bottom scouring and deposition, and stream sinuosity. Tertiary categories evaluate riparian and bank stability, bank vegetation and streamside cover.

The rate of stream discharge varies directly with the water velocity and the volume passing a specified point. Stream water discharge calculations were made using a Swoffer Instruments Model 2100 current meter per the manufacturers operating manual. The channel depth and width of the stream was measured. Velocity and volume are functions of the shape of the channel, the cross-sectional area of the channel, and the gradient. The discharge measurement is the summation of the products of the subsection areas of the stream cross section and their respective velocities. The computation of discharge was calculated using the general formula:

$$Q = \sum (av)$$

where:

Q = discharge (cubic feet per second [cfs])
a = area of the individual subsection
v = the corresponding mean velocity of the subsection.

The subsection is defined by depths at verticals 1, 2, 3,....n. At each vertical (0.5 feet) the velocities were measured using the current meter. The summation of the discharges for each subsection was the total discharge of the stream.

2.3 Water Quality Measurements

Water quality parameters were measured at all sampling locations using a Hydrolab 4a Water Quality Management System. The Hydrolab was used to measure temperature in degrees Celsius (°C), pH in standard units (std units), dissolved oxygen (DO) in milligrams per liter (mg/L), conductivity in microseimens per centimeter (µS/cm), and turbidity in nephelometric turbidity units (NTU). The Hydrolab had its calibration verified prior to data collection and after data collection was complete. The Hydrolab was used in accordance with Response, Engineering, and Analytical Contract (REAC) Standard Operating Procedure (SOP) # 2041, *Operation of the Hydrolab Surveyor 4a Water Quality Management System* and the manufacturer's operating manual.

2.4 Surface Water Sampling

Surface water was collected at each sampling location per REAC SOP #2013, *Surface Water Sampling.* Samples were collected directly into the appropriate container by hand. To avoid the incidental incorporation of suspended sediment into the sample, water was collected prior to other sampling activities that may disturb the sediment. Water samples were collected at half the maximum depth from the middle of the channel. The analytical parameters to be determined from each sample included total hardness, sulfate, alkalinity, dissolved organic carbon (DOC), and target analyte list (TAL) metals, plus U and radium (Ra).

2.5 Sediment Sampling

Sediment was collected at each sampling location per REAC SOP #2016, *Sediment Sampling* using a hand trowel while wading. Samples were collected from representative depositional areas. Effort was made to ensure that the sediment collected was stream bed sediment, rather than riparian soil, and that the fine grain, high organic fraction of the sediment was not lost. Locations which were mineral in nature (sandy and rocky) were not utilized, nor were locations which showed evidence of a terrestrial nature (e.g., plant roots). A volume of sediment sufficient to fulfill the analytical requirements was collected from several collocated grabs, placed into a 5-gallon plastic bucket, and homogenized with a plastic trowel. Aliquots for laboratory analyses were sieved through a number (#) 10 sieve (2 millimeter [mm] mesh) to exclude debris and gravel, and dispensed into appropriate sample containers. All unused sample material was returned to the site. Sediment samples were processed and analyzed for total organic carbon (TOC), particle size distribution, and TAL metals plus U and Ra.

2.6 Benthic Macroinvertebrate Tissue Sampling

A representative macroinvertebrate tissue sample was collected by hand from three sampling locations (BC-1, BC-3, and BC-6), using D-nets. Attempts to collect a composite sample of individuals from a dominant taxa representing a similar feeding group (e.g., detritovore or omnivore) were pursued between all locations, however, this was not practical since there was not a sufficient number of organisms available for such collection. Since it was not possible to collect sufficient mass of an individual species or trophic group in the targeted stream area, a composite sample of individuals representing the community residing at each location was collected. For each sample, the type and number of organisms collected for each composite sample were recorded (see Table 1).

Since there was a limited number of organisms available, only one composite sample was obtained for each station. To the extent possible, the organisms collected were rinsed of sediments first with site water, then using aspirator bottles containing distilled water, and then placed directly into the sampling containers. The organisms were not depurated. The tissue samples were placed in a cooler with dry ice and transported to the laboratory for analysis. Insufficient biomass was collected at the reference station (Rail Creek) to run the analysis. A frozen sample of mosquito larvae purchased from a tropical fish store was used as an analytical quality assurance/quality control (QA/QC) sample, designated as Ref-2. Tissue samples were processed and analyzed for TAL metals plus U, Ra, and percent solids.

2.7 Benthic Macroinvertebrate Community Structure Sampling

Prior to the collection of benthic macroinvertebrate tissue samples, thirty-two samples (four samples per location) of benthic invertebrates were collected. Three samples per location were collected using a D-net (Semi-quantitative samples, A-C), and one sample per station was collected using a sweep method (qualitative sample, D). The D-net sampling procedure employed a long-handled, D-frame net, measuring approximately 45 centimeters (cm) wide and 20 cm tall, with 500 micron (μm) mesh. An area equal to the width of the net and extending one meter upstream of the net was sampled. The stream bottom in this area was disturbed for a period of two minutes by overturning rocks and substrate to a depth of approximately 5 cm; dislodging organisms which were swept into the net by the current. All samples were collected for the same time period and by the same personnel. The sweep method used the D-net to collect a composite sample from a variety of substrates and habitats at each location to provide a qualitative assessment of macroinvertebrates that utilize the different substrates including undercuts along the creek, overhanging branches, and leaf packets. To prevent damage to the organisms during transport, the samples were transferred to sample bottles after removing large debris, stones, and other extraneous material after insuring that they were free of attached or clinging organisms.

The samples were shipped in polypropylene containers with 70 percent (%) isopropyl alcohol to for analysis. Each sample was identified to the lowest practical taxon, genus in most cases, using commonly accepted taxonomic references (Peckarsky *et al*. 1990, Wiggins 1996, Smith 2001, and Merrit and Cummins 1996). Chironomid larvae were counted but not identified to genus. Molluscs were identified to family level in most cases. Exuviae, empty shells, and pieces of larvae without heads were not included in counts. Identified organisms were placed into vials (by order in most cases) and preserved with 70% methanol.

Organism identification and enumeration was performed and recorded for each sample. Standard metrics; Shannon-Weaver diversity, taxa richness, Ephemeroptera/Plecoptera/Tricoptera (EPT) index, EPT:chironomid ratio, % contribution dominant taxa, modified Hilsenhoff biotic index (following Barbour *et al*. 1999), scraper:filterer ratio and shredder:total ratio were calculated for each sample. In addition, an average or composite metric (as appropriate) of the three replicate riffle samples (A-C replicates) for each of the seven stations and the Rail Creek reference were also calculated. The fourth qualitative sample (replicate D) in each location was used to calculate richness and shredder:total ratios only. These averages, as well as a community loss index, were used to calculate a Biological Condition Score following United States Environmental Protection Agency (U.S. EPA) procedures for Rapid Bioassessment Protocol (RBP) (Barbour *et.al*. 1999). These scores, along with statistical comparisons of density and diversity, examination of presence/absence and the Jaccard's similarity index were used to interpret the relative impact that mine activities may have had on the benthic communities in Blue Creek and the Eastern Drainage.

2.8 Radiological Screening Methods

Radiological screening of samples was performed by Veridian Corporation using a SAM-935 field gamma spectrophotometer and a Thermo-Eberline Identifier GR-135 for the purpose of verifying that no sample exceeded the activity level (2,000 picoCuries per gram [pCi/g]) that would require radioactive shipping and labeling regulations to be applied. A total of 97 samples were screened, and 90 of them (93%) were subjected to field gamma spectroscopic analysis.

3.0 Results

3.1 Habitat Analysis

3.1.1 Stream and Riparian Habitat Evaluation

The instream and riparian habitat was evaluated at all sampling locations in Blue Creek, the Eastern Drainage and Rail Creek to support the biological survey per Environmental Response Team (ERTC)/REAC SOP #2032 *Benthic Macroinvertebrate Sampling*, and U.S. EPA guidance (U.S. EPA 1989, U.S. EPA 1999). Habitat parameters pertinent to the assessment of biological quality are those that characterize the stream micro- and macroscale habitat and influence the structure of the biological community. These include epifaunal substrate/available cover, embeddedness, velocity-depth regime, sediment deposition, channel flow status, channel alteration, frequency of riffles (or bends), bank stability, bank vegetative protection, and riparian vegetative zone width (Table 2). For every location, the procedure assigned a numeric value for each habitat parameter, with the highest scores awarded to the best quality habitat. The individual values were summed to yield a total habitat score for each location, which was compared as a ratio to reference locations to provide a habitat comparability score. The comparability scores are associated with verbally descriptive assessment categories which include: “comparable to reference”; “supporting”; “partially supporting”; and “non-supporting” (Table 2). Rail Creek Location REF-1 and Blue Creek Location BC-1 were used as the reference locations for the habitat assessment (U.S. EPA 1989, U.S. EPA 1999).

3.1.2 Habitat Evaluation

Rail Creek is situated in a watershed adjacent to Blue Creek and differences in the terrestrial landscape are reflected in the appearance of the creek as well as the habitat assessment scores. In the vicinity of Location REF-1, the channel was well defined and highly sinuous with a large diversity of habitat types including riffles, runs, pools, and undercut banks. It flows through a heavily forested corridor. Snags and woody debris were abundant. The substrate was composed primarily of sand to cobble and boulder sized particles, and the sediment was normal in appearance and odor. Coarse particulate organic matter was present throughout the area, and was abundant in association with woody debris dams. Riffle, run, and pool sequences were present throughout, and deep pools were noted where undercut banks were well developed or waterfalls had scoured the substrate. Rail Creek in the area of Location REF-1 ranged to approximately 4-feet wide and 18-inches deep. The canopy cover was approximately 85%. Local watershed erosion potential was slight, and deep gullies or erosional features were not observed in the riparian area.

At Location REF-1, Rail Creek received an overall habitat assessment score of 184 (Table 3). Optimal scores were received for all assessment categories including epifaunal substrate/available cover, embeddedness, velocity-depth regime, sediment deposition, channel flow status, channel alteration, frequency of riffles, bank stability, bank vegetative protection, and riparian vegetative zone width.

The Eastern Drainage passes through a small culvert where the channel has been modified somewhat to accommodate this structure. Downstream of the culvert, the main channel is fairly well defined and ranges to approximately one-foot wide and six-inches deep. A broad forested wetland is present downstream of the culvert and the Eastern Drainage forms the core of this hydrosystem. The canopy cover in this area is almost 100%, and a dense understory is present. Within the wetland, flow dispersed into a series of shallow braided channels and rivulets, and this network expanded in complexity as the floodplain increasingly broadened downstream of the culvert. Due to the relatively gentle gradient in this area, water velocity was somewhat slow. The substrate in the channel consisted of fine to coarse sand and the substrate in the braided channels was fine sand with abundant organic matter;

the sediment was normal in appearance and odor. Local watershed erosion potential was slight, and deep gullies or erosional features were not observed in the riparian area.

The Eastern Drainage at Location ED-1 received an overall score of 75 (Table 3). Suboptimal scores were received for channel alteration, bank stability, bank vegetative protection, and riparian vegetation zone width (right bank); marginal scores were received for epifaunal substrate/available cover, channel flow status, and riparian vegetation zone width (left bank); and poor scores were received for embeddedness, velocity-depth regime, sediment deposition, and frequency of riffles.

Blue Creek flows through a relatively undisturbed, narrow and high gradient valley. Although paralleled by an improved dirt road, the stream corridor itself was forested, and a relatively dense understory and herbaceous layer was present along the stream banks. In several areas, the vegetation along the road was cleared to create parking pullouts, however no areas lacked a broad vegetated buffer strip along the stream bank, and the canopy cover ranged from 75 to 90%. Along the reach studied, the channel was well defined and increased from approximately 5-feet wide and 16-inches deep at the upstream extent to approximately 7-feet wide and 2-feet deep at the downstream extent. The substrate consisted of coarse sand to cobble sized particles with larger rocks and boulders scattered throughout, and was normal in appearance and odor. Some coarse particulate organic matter was present in the stream, particularly in snags and woody debris dams. Undercut banks were noted in the erosional portion of bends, and flow through this part of the study area was deep and fast.

Due to a significant storm event immediately preceding the field investigation, flow reached the upper portion of both banks and no stream bottom or channel substrate was exposed. Table 4 provides a summary of the stream flows measured during this sampling period. Riffle areas were present, but due to the high flow and steep gradient, were somewhat obscured and less well defined than might be the case during baseline flows. Flow, particularly in the upper portion of the study area, was turbulent and appeared to encroach on the terrestrial vegetation in the immediate riparian area. Further downstream, the flow was restricted to the channel itself and although rapid, was somewhat less turbulent. Local watershed erosion potential was slight, and deep gullies or erosional features were not observed in the riparian area.

Variation in the amount of woody structure in the channel and in the velocity-depth combinations accounted for slight differences in individual parameter scores obtained. The high flow observed during the field investigation likely obscured differences in habitat that would be more apparent during baseline flow conditions. Nevertheless, based on the observations made during the field investigation, Blue Creek was not highly variable throughout the study area nor was the habitat physically impacted by activities in the watershed (Table 3). Optimal scores were received for embeddedness, sediment deposition, channel flow status, channel alteration, and riparian vegetation zone width (left bank); suboptimal scores were received for epifaunal substrate/available cover, frequency of riffles, bank stability, bank vegetative protection, and riparian vegetation zone width (right bank); and a marginal score was received for velocity-depth regime.

3.1.3 Habitat Assessment

When compared to Rail Creek Location REF-1, the habitat at Blue Creek Locations BC-1 through BC-6 were assigned assessment categories of "supporting" and the habitat at Eastern Drainage Location ED-1 was assigned assessment category "non-supporting." In contrast, when compared to Blue Creek Location BC-1, Locations BC-1 through BC-6 were assigned assessment categories of "comparable to reference" and the habitat at Location ED-1 was assigned assessment category of "non-supporting."

3.2 Water Quality and Surface Water Analysis

Table 5 provides the water quality and analytical results. Dissolved oxygen was above 10 mg/L and water temperature ranged from 3° C to 7° C. The pH ranged from 7.4 to 7.9. Conductivity, total hardness, and sulfate levels were significantly higher at ED-1 than the Blue Creek locations or Rail creek. Total hardness and sulfate levels at ED-1 were 862 mg/L and 815 mg/L, respectively. It is suspected that the high flow conditions of Blue Creek from the recent storm event contributed to diluting these values at BC-3 with total hardness and sulfate values of 69 mg/L and 42 mg/L, respectively. The lowest values for total hardness and sulfate occurred at BC-1 and BC-2.

Cadmium (Cd), calcium (Ca), magnesium (Mg), manganese (Mn), nickel (Ni), potassium (K), sodium (Na), U, and zinc (Zn) were higher at ED-1 than the Blue Creek locations (Table 4). The high Ca and Mg values reflect the high hardness values previously described, as well as the dilution effect of these analytes once discharged into Blue Creek. Cadmium levels were not detectable at any locations except ED-1. Location ED-1 had 2,900 micrograms per liter (µg/L) Mn, compared to less than 170 µg/L at BC-3 and BC-4, and the less than 35 µg/L BC-1 and BC-2. Nickel was detected at 82 µg/L at ED-1, but at less than 5 µg/L at BC-3 and BC-4, and below detection limits at the remaining locations. The U concentration at ED-1 (33.2 µg/L), was more than four times that found at the Blue Creek stations, BC-1 and BC-2 had the lowest U concentrations (less than 4 µg/L). The Zn level at ED-1 was 72.4 µg/L, which was more than seven times that found at BC-3 and BC-4. Zinc was below the detection limit at BC-1 and BC-2. Radium levels appeared to be slightly higher at BC-1 and BC-2 than at the middle and lower Blue Creek locations.

3.3 Sediment Analysis

Table 6 provides the sediment characterization and analytical results. Location ED-1 had the highest TOC, at 13.1%. The remaining Blue Creek stations had TOC ranging from 2.3% to 5.3%. Particle size distribution was fairly consistent between the Blue Creek stations. ED-1 had a higher proportion of silt than the Blue Creek stations and Ref-1 had a higher proportion of sand.

Like the surface water analysis, several analytes in the sediments - arsenic (As), barium (Ba), beryllium (Be), Cd, Ca, cobalt (Co), copper (Cu), lead (Pb), Mn, Ni, Ra, and Zn - were higher at ED-1 than the Blue Creek stations (Table 5). The As level at ED-1 was 8.9 milligrams per kilogram (mg/kg) compared to BC-1 at 2.0 mg/kg. Barium was 222 mg/kg at ED-1, two to four times higher than at the Blue Creek stations and Ref-1. Cadmium was 12 mg/kg at ED-1, at least twelve times that in the Blue Creek stations.

The Co level of 30 mg/kg at ED-1 was about three to six times higher than the Co levels at the Blue Creek stations and the Ref-1 station. Likewise, the Cu level of 19 mg/kg at ED-1 was three to five times higher than at the Blue Creek stations. The Pb level at ED-1 was 12 mg/kg while the Pb levels at the Blue Creek stations ranged from 5.9 mg/kg at BC-3 to 9.1 mg/kg at BC-6. A high Mn level of 31,000 mg/kg was detected at ED-1. In comparison, the Mn levels at the upper Blue Creek stations (i.e., BC-1 and BC-2) ranged between 290 mg/kg and 340 mg/kg and at the middle and lower Blue Creek stations ranged between 530 mg/kg to 2500 mg/kg. The Ref-1 station had 140 mg/kg Mn.

Nickel at ED-1 was one to two orders of magnitude higher than at the Blue Creek stations. Zinc also appeared to be elevated at ED-1 with 440 mg/kg compared to the Blue Creek stations and the Ref-1 station ranging from 27 mg/kg to74 mg/kg.

The highest U concentrations were found at BC-3 and BC-4, at 14.5 mg/kg and 17.2 mg/kg, respectively. Stations BC-1, BC-2, BC-5, BC-6, and ED-1 had U ranging between 8 mg/kg and 13 mg/kg. The Ref-1 station did not have detectable U concentrations.

3.4 Tissue Analysis

Table 7 provides the analytical results for each of the three composite samples for the tissue analysis collected at locations BC-1, BC-3, and BC-6. Cadmium, Pb, Mn, Ni, Ra, and U had higher tissue levels at BC-3 and BC-6 compared to BC-1 and the reference sample (Ref-2). Cadmium at BC-3 was three times greater than BC-1with concentrations of 25.4 mg/kg versus 7.2 mg/kg. Lead was below the sample detection limit at BC-1, but was detected at BC-3 and BC-6 at concentrations above 10 mg/kg. Manganese at BC-3 and BC-6 was two to three times greater than at BC-1 (18,000 mg/kg, 14,000 mg/kg and 6,500 mg/kg respectively). Nickel at BC-3 and BC-6 was over seven times higher than at BC-1 (170 mg/kg, 150 mg/kg, and 20.4 mg/kg respectively). Tissue levels for U ranged from 1.9 mg/kg at BC-1 to 12.9 mg/kg at BC-3 to 36.1 mg/kg at BC-6.

3.5 Macroinvertebrate Community Structure

The organisms in each sample were identified to the lowest practical taxon and enumerated in Table 8. Organism density ranged from 37 (BC-6C) to 2,576 (BC-5A). The total number of distinct taxa identified (taxa richness) ranged from 5 (BC-6B) to 27 (BC-3A, D), with the lowest richness found at Stations BC-6 and ED-1, and the highest from the upstream stations at Blue Creek (BC-1 and BC-2). Standardized community metrics were calculated for each sample (Table 9).

The lowest taxa abundance and EPT taxa abundance was observed in the Eastern Drainage. Both the overall taxa richness and EPT taxa richness declined at location BC-4 relative to the upstream locations (BC-1, BC-2 and BC-3) , with recovery at Location BC-5 followed by a drop at Location BC-6 to a level comparable to ED-1(Figure 2). Evaluation of the data by presence/absence of taxa across the stations (Table 10) shows that the mayflies (Ephemeroptera) are the group most consistently lost in the Eastern Drainage and downstream from BC-3 in Blue Creek. Mayflies tend to be the more dominant taxa in the upstream Blue Creek and Reference locations as well as in BC-3, but are replaced by either stoneflies (Plectoptera) or caddisflies (Trichoptera) as dominant taxa at BC-4 and BC-5 (Figures 3 and 6). At location BC-6 true flies (Diptera) are the most prevalent and at location ED-1 stoneflies are the most abundant (Figures 3 and 6).

Sorenson's and Jaccard's similarity coefficients were used to analyze the entire macroinvertebrate community (Tables 11 and 12). The Jaccard's coefficient indicates a change in community composition across the study area with BC-6 and ED-1 being consistently the most unlike the reference conditions. Further evaluation using Sorenson's coefficient to compare all possible combinations of similarity indicate that Locations BC-4 and BC-5 are the most alike, with locations BC-1, BC-2 and BC-3 the next most similar. The ED-1, BC-6 and REF-1 locations are the most different from both each other and the remainder of the locations. The habitat evaluation provided in Section 3.1.2 reiterates the differences observed at both ED-1 and REF-1 relative to the other stations. These habitat differences would influence the structure of the macroinvertebrate community.

The data were further examined by combining both the presence of particular taxa and their relative abundance. The variability in density between and among stations was quite high, and consequently there was no statistical significance observed (Figure 4). The high variability was based mostly on a few samples with high numbers of one genus of blackfly (Simuliidae) larvae. One sample at Location BC-5 had over 2000 larvae and at Location BC-2 over 1000 larvae were collected in one sample (Table 8). While blackfly larvae are relatively neutral in sensitivity to pollution, the most common genus collected, *Prosimulium*, is actually moderately sensitive to pollution (Tolerance Level 3). However, the distribution of blackfly larvae in streams can often be highly localized. In Spring, very large numbers of blackfly larvae will group together on the surface of flattened rocks in fast moving riffles as they prepare for emergence. If one of these surfaces is sampled randomly, many hundreds of larvae may be collected and bias the sample. This phenomenon can have a large impact on resolving any dose response assessments in abundance or diversity. To overcome this apparent bias, a comparison of the analysis between when the blackfly larvae are included (Figure 4) versus when the larvae are removed (Figure 5) is provided. Figure 5 shows when the blackfly larvae are removed from the analysis that the relative densities for total abundance and EPT abundance between upstream locations (BC-1, BC-2) and Middle Blue Creek Locations (BC-3 and BC-4) have similar values followed by a slight decrease in abundance at BC-5 (Figures 4 and 5). However, the loss of mayflies and replacement by caddisflies and stoneflies at Locations BC-4 and BC-5 can be better observed once the blackflies are removed from the relative abundance analysis (Figure 6). Note that at location BC-6, true flies (Diptera, Family Chironomidae) were still the dominant taxa, even without the blackfly larvae (Figure 6 and Table 1).

Diversity index methodology was used for comparing community structure between locations. Previous macroinvertebrate surveys of Blue Creek conducted in 1986-87 (Cairns, *et al*. 1988, Plotnikoff, *et al*. 1988) utilized the Shannon-Weaver index for diversity, so it was calculated here as well. The highest diversity appeared to be at the Rail Creek reference, followed by the upstream Blue Creek locations. Diversity dropped off consistently downstream with the lowest observed diversity at BC-6 (Figure 7). The drop in diversity at location BC-2 seen in Figure 7 was again likely due to the presence of a few samples with abundant blackflies, prompting exclusion of the blackflies and re-analysis (Figure 8). Both locations ED-1 and BC-6 were consistently shown to have lower diversities with or without the exclusion of the blackflies (Figures 7 and 8). However, locations BC-4 and BC-5 were also identified with lower diversity depending on whether blackflies were included. When blackflies were excluded (Figure 8), the diversity at BC-4 was lower, but was not at location BC-5.

A more comprehensive analysis is possible using the procedures outlined in U.S. EPA (1999). In this method, community metrics are calculated for each sample, then averaged across replicates or recalculated as appropriate to determine the community metrics for each of the locations. Metrics for taxa richness, EPT index and abundance, scraper to filterer ratio, shredder to total ratio, community loss index and chironomid abundance were recalculated based on a composite of all three replicates (Table 13). The condition score for each location was then determined by comparing the scores for a location to either the Rail Creek reference or BC-1. Condition scores relative to the Rail Creek Reference ranged from a low of 16.7 at Location BC-6 to a high of 62.5 at Locations BC-1 and BC-3. Using the BC-1 as the reference did not change the relative magnitude of the results, but the lowest condition score was 40.9 at BC-6 and the highest was 86.4 at BC-3. The biological condition category was determined according to the RBP protocol outlined by Barbour *et al.* (1999). Biological impairment in Eastern Drainage was moderate regardless of which reference, but ranged from slight to severe in Blue Creek, with Location BC-6 consistently scoring the lowest (Figure 9 and Table 13).

It is important to acknowledge that there is uncertainty associated with this study. One source of uncertainty is the error related to any biological sampling effort, along with the natural variability of biological communities. Another source of uncertainty is sampling efforts compromised by changes of natural conditions, such as a storm event. The storm that occurred prior to this sampling event would be expected to have influenced the sampling effort, and perhaps biased the data in several ways. One way is that the swift current and high water levels in Blue Creek reduced investigators ability to be consistent in visually selecting similar type of bottom substrate for the D-net collections. Another concern is that the high water velocity in Blue Creek could cause drifting of organisms from the upstream stations to the downstream stations. However, the degree or extent of the drifting of macroinvertebrates to the downstream stations is unknown.

Overall, it is apparent that the macroinvertebrate communities of the Eastern Drainage and Blue Creek have been influenced by the mine drainage, however, the uncertainty associated with this study needs to be considered.

The Eastern Drainage, Locations BC-4, BC-5 and BC-6 showed signs of stress based on this sampling. The almost complete loss of mayflies at these stations is a likely indication of environmental stress. In fact, the change in the community structure as evidenced at BC-4 would be an expected outcome based on the environmental setting of Blue Creek below the influence of the Eastern Drainage discharge. Although the impact of the mine drainage to the macroinvertebrate community would not be expected to be extensive, the cause of any impact would be difficult to ascertain. The environmental setting of Middle Blue Creek is characterized with in-place sediment contamination, metals loading of the surface water from the Eastern Drainage, and altered water quality characteristics (e.g., high hardness, high conductivity, and high sulfate) from the Mine drainage.

3.6 Radioactive Screening of Samples

Every sample collected from Blue Creek and the Eastern Drainage sites on was screened for radioactivity. All samples were less than 2% of the United States Department of Transportation

(U.S. DOT) definition of radioactivity (2,000 pCi/L) that eliminated any radioactive shipping or labeling regulations to apply.

4.0 DISCUSSION OF RESULTS

The aquatic studies conducted during the week of March 18, 2003 allowed a relative examination of the aquatic habitats in Blue Creek above and below the confluence with the Eastern Drainage. The emphasis of the study plan was to monitor for metals in surface water, sediment, and biota, and to assess the structure of the macroinvertebrate community.

The storm-related high flow conditions during this sampling period presented a potential influence on the dilution of the discharge flowing from the Eastern Drainage into Blue Creek. This was made apparent by the higher concentrations of total hardness and sulfate at ED-1 relative to the Middle Blue Creek locations (BC-3 and BC-4). Several metals (Cd, Mn, Ni, K, Na, U, and Zn) were also found at higher concentrations in surface water at ED-1 than at the Blue Creek locations (Table 5).

An attenuation of surface water concentrations of Mn, Ni, U, and Zn, along with sulfate and hardness concentrations was observed from the Upper Blue Creek locations (BC-1 and BC-2) to the Middle Blue Creek locations (BC-3 and BC-4) and the Lower Blue Creek locations (BC-5 and BC-6). It could be expected that when baseline flow conditions exist in Blue Creek, these COPCs may be at higher concentrations at the Middle and Lower Blue Creek locations than found during this sampling period. Only Ra levels were detected at slightly higher levels at Upper Blue Creek locations than Middle and Lower Blue Creek stations (Table 5).

The sediment levels for As, Ba, Be, Cd, Ca, Co, Cu, Pb, Mn, Ni, Ra, and Zn were higher at ED-1 than at the Blue Creek stations. In addition, Cd, Ni, Mn, U, and Zn were found at higher concentrations at the middle and lower Blue Creek locations than at the upper Blue Creek locations (Table 6).

A comparison of the composite macroinvertebrate tissue samples from each location indicated higher concentrations of Cd, Pb, Mn, Ni, Ra, and U at Locations BC-3 and BC-6 than at Location BC-1 (Table 7). The tissue concentrations at BC-3 and BC-6 were three or more times greater than at BC-1. It must be recognized that this examination was based on a single composite sample of organisms from each of the three locations, precluding any statistical evaluation of the data.

The analysis of macroinvertebrate community structure indicated signs of stress at Locations BC-4, BC-5, and BC-6, as well as the Eastern Drainage when compared to BC-1, BC-2, BC-3, or to the reference station. Location BC-3 did not reveal signs of stress similar to the other middle and lower Blue Creek locations, it is unknown to what degree the drift of organisms from upstream locations contributed to this finding.

Several methods were employed to evaluate changes in community structure between locations. One significant indicator of stress was the almost complete loss of mayflies at locations BC-4, BC-5, and BC-6 as compared to Locations BC-1, BC-2, and BC-3. To better examine the data, the localized patchiness of the blackfly larvae collected at two locations was removed from the analysis. When comparing total abundance and EPT abundance between upper and middle Blue Creek locations (BC-1 to BC-4), the locations show hardly any differences (Figures 4 and 5). However, when evaluating community structure, the loss of mayflies and the replacement by caddisflies and stoneflies at locations BC-4 and BC-5 can be better observed once the blackflies are removed from the relative abundance analysis (Figure 6). When applying the Shannon-Weaver index for diversity based on the presence or exclusion of blackfly larvae, Locations BC-4 and BC-5 were also identified with lower diversity depending on whether blackflies were included. When blackflies were included, Location BC-5 was shown to have lower diversity (Figure 7). However when blackflies were excluded (Figure 8), the diversity at Location BC-4 was lower, but diversity at Location BC-5 was not.

When Sorenson's or Jaccard's coefficients of similarity were applied to the data, Locations BC-6 and ED-1 were identified as the most different from each other and from the other locations. The Sorensen's coefficient indicated that Locations BC-4 and BC-5 were the most alike, with locations BC-1, BC-2 and BC-3 the next most similar (Tables 8 and 9). In addition, community bioassessment was also examined using a comparison of the condition scores to either the Rail Creek reference or Location BC-1, which indicated that biological impairment in the Eastern Drainage was moderate, but ranged from slight to severe amongst the Blue Creek locations, with Location BC-6 consistently scoring the lowest (Figure 9 and Table 13).

A comparison of macroinvertebrate community structure from this study to historical surveys (Cairns, *et al.* 1988; Plotnikoff, *et al.* 1988) presents similarities. Surveys conducted from April to October, 1986 and February to October, 1987 concluded that mine drainage from Eastern Drainage to Blue Creek caused a significant impact on macroinvertebrate density and diversity. There was a 65% to 85% reduction in organism density in Blue Creek just below the confluence with the Eastern Drainage. The upstream Blue Creek stations generally contained six to eight taxa in significant numbers, including Diptera (flies, midges, and mosquitoes), Coleopotera (beetles), Ephemeroptera, Trichoptera, Plecoptera, Mollusca (mollusks), and Oligochaeta (worms), while the middle Blue Creek stations contained one to five taxa, with only Diptera, Plecoptera, and Trichoptera present in significant numbers. The lower Blue Creek stations below the confluence with Oyachen Creek still indicated impact, with two to six taxa in significant numbers. The Eastern Drainage station consistently showed one to two orders of magnitude lower densities of macroinvertebrates than the Blue Creek stations.

For this study a reduction of the density of organisms was not evident in Blue Creek below the confluence of the Eastern Drainage compared to upstream locations as was indicated in the 1986 and 1987 surveys. However, like the 1986-87 surveys, a community shift occurs at the downstream locations below the confluence of the Eastern Drainage. Plecoptera was demonstrated to be tolerant to the mine drainage in the 1986 and 1987 studies as it was in this study, particularly at Location ED-1. Like the 1986 and 1987 studies, most types of organisms were found in significant numbers at the upper Blue Creek locations, but fewer taxa at significant numbers were found at Locations BC-4, BC-5 and BC-6 during this study. Stress was indicated at the BC-3 location during the 1986 and 1987 surveys.

There is uncertainty associated with the potential impact of the mine drainage to Middle Blue Creek based on this study. The storm prior to sampling may have biased the sampling efforts and data. This may be shown by the community structure determined at BC-3 and its similarities to BC-1 and BC-2. The overall impact of mine drainage was not expected to be extensive, though the causative effects are difficult to ascertain. For instance, it is not known what seasonal effects may exist, or the extent of the mixing zone of the Eastern Drainage discharge into Blue Creek. It is also not known what the effects are of contamination to the aquatic communities, or what the effects are from changing water quality characteristics (e.g., high hardness, high conductivity, and high sulfate) on the aquatic communities in Middle and Lower Blue Creek.

5.0 LITERATURE CITED

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Table O 1: Composite Samples of Organisms Collected for Tissue Analysis
Midnite Mine Site
Wellpinit, WA

Sample BC-1			Sample BC-3			Sample BC-6	
Total wet weight = 8.8 gms			Total wet weight= 5.2 gm			Total wet weight = 8.0 gm	
	No.			No.			No.
Hydropsychidae	25		Hydropsychidae	28		tipulidae	1
pelopertidae	4		leech	1		large stonefly	1
worms	19		blackflies	23		Hydropsychidae	15
tipulidae	1		mayflies	25		stone fly cased	39
leaf case trichop	2		large stonefly	2			
small stoneflies	20		worms	5		Total # of organisms	56
small mayflies	20		beetle larvae	2			
			stonefly	3			
Total # of organisms	91		adult beetle	1			
			Chironomid	3			
			Empididae	2			
			leaf case caddisflies	1			
			Total # of organisms	96			

Table O 2. Summary of Bioassessment Protocol Habitat Scoring and Categories used for Rail Creek, the Eastern Drainage, and Blue Creek
Midnite Mine Site
Wellpinit, WA
March, 2003

Habitat/Parameter	Condition Rating			
	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/Available Cover	20 - 16	15 - 11	10 - 6	5 - 0
Embeddedness	20 - 16	15 - 11	10 - 6	5 - 0
Velocity-Depth Regime	20 - 16	15 - 11	10 - 6	5 - 0
Sediment Deposition	20 - 16	15 - 11	10 - 6	5 - 0
Channel Flow Status	20 - 16	15 - 11	10 - 6	5 - 0
Channel Alteration	20 - 16	15 - 11	10 - 6	5 - 0
Frequency of Riffles (or Bends)	20 - 16	15 - 11	10 - 6	5 - 0
Bank Stability	10 - 9	8 - 6	5 - 3	2 - 0
Bank Vegetative Protection	10 - 9	8 - 6	5 - 3	2 - 0
Riparian Vegetative Zone Width	10 - 9	8 - 6	5 - 3	2 - 0

Assessment Category	Percent of Comparability
Comparable to Reference	> 90
Supporting	75-88
Partially Supporting	60-73
Non-supporting	< 58

Table O 3. Summary of Bioassessment Protocol Habitat Scores for
Rail Creek, the Eastern Drainage, and Blue Creek
Midnite Mine Site
Wellpinit, WA
March, 2003

Habitat Parameter		Sample Location							
		Rail Creek	Eastern Drainage	Blue Creek					
				1	2	3	4	5	6
Epifaunal Substrate/Available Cover		19	8	15	15	15	14	13	12
Embeddedness		19	2	18	18	18	18	18	18
Velocity-Depth Regime		18	2	8	8	8	8	8	8
Sediment Deposition		19	2	18	18	18	18	18	18
Channel Flow Status		18	8	18	18	18	18	18	18
Channel Alteration		19	13	16	16	16	16	16	16
Frequency of Riffles (or Bends)		18	2	12	12	13	14	15	16
Bank Stability	Left Bank	9	7	8	8	8	8	8	8
	Right Bank	9	7	8	8	8	8	8	8
Bank Vegetative Protection	Left Bank	9	7	8	8	8	8	8	8
	Right Bank	9	7	8	8	8	8	8	8
Riparian Vegetative Zone Width	Left Bank	9	4	9	9	9	9	9	9
	Right Bank	9	6	8	7	6	7	6	6
Total Score		184	75	154	153	153	154	153	153
Comparability									
To location Rail Creek (Ref -1)		NA	0.41	0.84	0.83	0.83	0.84	0.83	0.83
To location Blue Creek 1		1.19	0.49	NA	0.99	0.99	1.00	0.99	0.99

Note: left and right banks determined while facing downstream

Table O 4. Summary of Flow and Discharge Measurements for
Rail Creek, the Eastern Drainage, and Blue Creek
Midnite Mine Site
Wellpinit, WA
March, 2003

Intervals (ft)	Rail Creek Creek		Eastern Drainage		Blue Creek											
					1		2		3		4		5		6	
	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)	Depth (ft)	Velocity (ft/sec)
0'	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.2	0.00	0.6	0.06
0.5'	0.6	1.86	0.4	0.65	0.7	0.15	0.5	5.04	0.9	1.75	0.6	1.53	0.2	0.00	0.9	0.06
1'	0.7	1.92	0.5	0.65	0.9	0.36	0.7	5.52	1.1	1.62	1.2	3.40	0.2	0.00	1.0	0.15
1.5'	0.5	1.63	0.5	0.59	1.2	1.66	1.0	3.37	1.1	1.91	1.6	3.16	0.1	0.00	1.2	0.33
2.0'	0.6	1.52	0.0	0.00	1.4	2.59	0.9	4.70	1.2	2.24	1.8	2.95	0.1	0.00	1.4	0.59
2.5'	0.5	1.88			1.4	2.57	1.0	2.27	1.3	2.00	2.0	2.63	0.1	0.00	1.7	0.90
3.0'	0.4	1.56			1.2	1.91	1.1	3.59	1.5	1.35	2.0	2.78	0.2	0.77	1.8	2.01
3.5'	0.3	1.42			1.4	0.87	0.8	3.24	1.1	2.38	1.7	2.18	0.6	2.15	1.6	3.62
4.0'					0.8	1.20	0.9	4.25	0.8	2.69			1.1	4.06	1.9	3.59
4.5'					0.8	1.33	0.8	1.72					1.1	4.99	1.8	2.32
5.0'					1.3	1.37							1.2	6.04	1.7	1.82
5.5'													1.1	5.61	1.5	1.03
6.0'													1.3	4.52	1.7	0.68
6.5'													1.2	4.34	1.5	0.72
7.0'													1.2	3.44	1.4	0.79
7.5'													1.0	2.65		
8.0'													10.9	1.92		
8.5'													0.7	0.13		
9.0'													0.4	0.03		
Mean Velocity (ft/sec)	1.47		0.47		1.27		3.37		1.77		2.33		2.14		1.24	
Mean Depth (ft)	0.5		0.4		1.0		0.8		1.0		1.4		1.2		1.4	
Width (ft)	3.5		1.5		5.0		4.5		4.0		3.5		9.0		7.0	
Discharge (cfm)	2.3		0.2		6.4		11.7		7.1		11.1		23.2		12.6	

Table O 5. Water Quality and Chemical Analysis of Surface Water
Midnite Mine Site
Wellpinit, WA

Location		BC-1	BC-2	ED-1	BC-3	BC-4	BC-5	BC-6	Ref-1
Analyte	**Units**	Water Quality							
Dissolved Oxygen	mg/L	10.5	11.36	10.6	11.31	10.85	11.75	12.5	10.99
Temperature	^oC	6.87	5.5	5.7	4.12	5.93	4.98	3.1	5.54
pH	Std Units	7.6	7.44	7.6	7.45	7.8	7.9	7.8	7.6
Turbidity	NTU	42.5	41.5	20.9	43.9	37.8	44.1	30	12
Conductivity	µS/cm	56.7	71.1	1530	163.9	181.3	155.2	162.7	80.3
Alkalinity	mg/L	27.8	33.9	74	33.9	39.1	43.2	45.2	
Total Hardness	mg/L	22	30	862	69	77	67	71	34
Calcium Hardness	mg/L	16	21	524	45	52	47	50	21
Sulfate	mg/L	2.88	3.94	815	42	49.2	34.3	37.1	
Dissolved Organic Carbon	mg/L	7.29 J	7.58 J	5.35 J	7.8 J	8.19 J	8.22 J	8.1 J	6.48 J
Metals									
Aluminum	mg/L	1	2.7	0.27	3.5	0.73	0.71	2.5	0.55
Antimony	µg/L	U (6.81)	U (6.81)	U (6.81)	U (6.81)	U (6.81)	U (6.81)	U (6.81)	U (6.81)
Arsenic	µg/L	U (4.1)	U (4.1)	U (4.1)	U (4.1)	U (4.1)	U (4.1)	U (4.1)	U (4.1)
Barium	µg/L	41.3	44.9	16.2	42.9	35.2	30.8	31.4	52.5
Beryllium	µg/L	0.241	0.232	0.465	0.269	0.36	0.196	0.244	U (0.133)
Cadmium	µg/L	U (0.807)	U (0.807)	1.93	U (0.807)	U (0.807)	U (0.807)	U (0.807)	U (0.807)
Calcium	mg/L	6.3	8.6	210	18	21	19	20	8.5
Chromium	µg/L	U (1.37)	U (1.37)	U (1.37)	U (1.37)	U (1.37)	U (1.37)	U (1.37)	U (1.37)
Cobalt	µg/L	U (1.88)	U (1.88)	U (1.88)	U (1.88)	U (1.88)	U (1.88)	U (1.88)	U (1.88)
Copper	µg/L	U (3.91)	U (3.91)	U (3.91)	U (3.91)	U (3.91)	U (3.91)	U (3.91)	U (3.91)
Iron	mg/L	0.58	1.4	0.11	1.9	0.46	0.64	1.3	0.5
Lead	µg/L	U (2.67)	U (2.67)	U (2.67)	U (2.67)	U (2.67)	U (2.67)	U (2.67)	U (2.67)
Magnesium	mg/L	1.6	2.1	82	5.8	5.9	4.7	5	3
Manganese	µg/L	24	32	2900	150	170	81.5	60.5	15.7
Nickel	µg/L	U (2.82)	U (2.82)	82	4.97	4.03	U (2.82)	U (2.82)	U (2.82)
Potassium	mg/L	1.7	1.8	3.9	1.9	1.8	1.7	1.8	2.1
Radium	pCi/L	4.37	3.53	U (1)	2.95	2.5	1.76	2.41	0.541 J
Selenium	µg/L	U (4.2)	U (4.2)	U (4.2)	U (4.2)	U (4.2)	U (4.2)	U (4.2)	U (4.2)
Silver	µg/L	U (2.5)	U (2.5)	U (2.5)	U (2.5)	U (2.5)	U (2.5)	U (2.5)	U (2.5)
Sodium	mg/L	5.2	5.6	20	6.2	6.4	6.4	6.5	5.5
Thallium	µg/L	U (6.27)	U (6.27)	U (6.27)	U (6.27)	U (6.27)	U (6.27)	U (6.27)	U (6.27)
Uranium	µg/L	3.76	3.64	33.2	6.94	7.73	7.8	6.93	0.843 J
Vanadium	µg/L	U (3.12)	4.5	U (3.12)	4.16	U (3.12)	U (3.12)	3.49	U (3.12)
Zinc	µg/L	U (0.494)	U (0.494)	72.4	10.6	8.73	14.9	U (0.494)	U (0.494)

µg/L - micrograms per liter
mg/L - milligrams per liter
Std Units - Standard Units
^oC - Degrees Celsius
pCi/L - pico Curies per liter
µS/cm - micro seimens per centimeter
NTU - Nephelometric Turbidity Units
U - Not Detected
(#) - Method Detection Limit
J - Estimated Value
Ref-1 - Rail Creek

Table O 6. Sediment Characteristics and Metal Analysis
Midnite Mine Site
Wellpinit, WA

Location		BC-1	BC-2	ED-1	BC-3	BC-4	BC-5	BC-6	Ref-1
Percent Solids		49	56	44	49	50	65	63	71
Analyte	**Units**	Loss on Ignition							
Total Organic Carbon	%	3.319	2.298	13.125	5.284	5.223	2.884	3.835	1.096
Particle Size Distribution									
Fine Gravel	%	5.78	1.88	0.43	3.69	1.92	3.87	6.56	0.38
Coarse Gravel	%	16.94	11.71	7.38	13.32	10.4	22.99	10.46	6.88
Medium Sand	%	26.08	15.1	14.66	33.37	19.17	24.32	14.49	57.81
Fine Sand	%	35.4	53.31	22.71	29.51	43.51	36.56	49.37	29.22
Silt	%	11.05	11.25	45.96	13.74	16.93	7.77	16.65	2.9
Clay	%	4.75	6.75	8.86	6.37	8.07	4.49	2.47	2.81
Metals									
Aluminum	mg/kg	9900	10000	14000	9500	12000	6900	12000	5800
Antimony	mg/kg	U (0.65)	0.63	U (0.74)	U (0.7)	U (0.63)	U (0.51)	0.93	0.66
Arsenic	mg/kg	2	2.6	8.9	2.3	3.3	2.7	6.1	1.1
Barium	mg/kg	84	63	222	51	89	45	79	110
Beryllium	mg/kg	0.74	0.8	3	0.88	0.99	0.59	0.89	0.19
Cadmium	mg/kg	U (0.09)	0.12	12	1.1	0.8	0.42	0.48	U (0.063)
Calcium	mg/kg	2900	3700	8100	2600	3200	2000	3700	2200
Chromium	mg/kg	5.5	5.8	U (8.7)	5.5	6.9	5.5	10	14
Cobalt	mg/kg	3.9	4	30	4.7	11	6.4	8.8	5.1
Copper	mg/kg	6.3	6.3	19	4.4	6.2	4.1	8.6	3.1
Iron	mg/kg	9500	9600	13000	10000	14000	10000	15000	9000
Lead	mg/kg	6.3	6.2	12	5.9	8.6	6	9.1	2.5
Magnesium	mg/kg	2300	2200	3800	2400	3000	2100	3800	3400
Manganese	mg/kg	340	290	31000	650	2500	530	1200	140
Mercury	mg/kg	0.032	0.024	0.039	0.026	0.028	0.01	0.021	0.0063
Nickel	mg/kg	4.6	5	400	26	34	14	24	8.5
Potassium	mg/kg	1600	1600	1700	1800	2200	1400	1900	2100
Radium	pCi/g	5.06	7.5	13.2	4.94	9.97	5.72	6.19	2.37
Selenium	mg/kg	U (0.31)	U (0.27)	U (8.8)	U (0.33)	1.5	U (0.24)	0.44	U (0.21)
Silver	mg/kg	U (0.17)	U (0.15)	U (4.9)	U (0.18)	U (0.17)	U (0.13)	U (0.14)	U (0.12)
Sodium	mg/kg	180	170	200	150	210	90	140	82
Thallium	mg/kg	U (1)	U (1.7)	U (54)	U (2)	U (4.6)	U (3.7)	U (3.8)	U (3.3)
Uranium	mg/kg	8.03	10.3	10.2	14.5	17.2	11.3	12.8	0.922 J
Vanadium	mg/kg	17	17	25	16	24	17	23	23
Zinc	mg/kg	35	32	440	62	74	47	68	27

Results reported in dry weight
mg/kg - milligrams per kilogram
pCi/g - pico curries per gram
U - Not Detected
(#) - Method Detection Limit
J - Estimated Value
% - percent

Table O 7. Macroinvertebrate Tissue Analysis
Midnite Mine Site
Wellpinit, WA

Location		BC-1	BC-3	BC-6	Ref-2
Percent Solids		13	11	17	7
Analyte	**Units**	Metals			
Aluminum	mg/kg	17000 J	16000	21000	U (26.7)
Antimony	mg/kg	U (25.7)	U (13.5)	U (7.78)	U (9.17)
Arsenic	mg/kg	U (15.5)	10.0	5.9	U (5.5)
Barium	mg/kg	1700	450	1500	4.9
Beryllium	mg/kg	1.5	2.1	2.2	U (0.18)
Cadmium	mg/kg	7.2	25.4	11.2	U (1.09)
Calcium	mg/kg	26000	24000	20000	1700.0
Chromium	mg/kg	14.3	11.3	18.2	U (1.8)
Cobalt	mg/kg	28.1	11.3	15.1	U (2.5)
Copper	mg/kg	210	110	110	10.0
Iron	mg/kg	15000	13000	17000	77.0
Lead	mg/kg	U (10.1)	13.7	14.3	U (3.6)
Magnesium	mg/kg	13000	9900	12000	1500
Manganese	mg/kg	6500	18000	14000	12.0
Nickel	mg/kg	20.4	170	150	U (3.8)
Potassium	mg/kg	78000 J	42000	130000	9500
Radium	pCi/g	U (2)	4.03	3.04	U (2)
Selenium	mg/kg	U (15.9)	16.4	U (23.9)	U (5.7)
Silver	mg/kg	U (9.4)	U (4.96)	U (2.8)	U (3.4)
Sodium	mg/kg	39000 J	22000	23000	14000
Thallium	mg/kg	U (23.6)	U (12.5)	U (7.2)	U (8.4)
Uranium	mg/kg	1.9	12.9	36.1	U (1)
Vanadium	mg/kg	38.2	30.7	69.2	U (4.2)
Zinc	mg/kg	2300	1900	2400	82.0

Results reported in dry weight
mg/kg - milligrams per kilogram
pCi/g - pico Curies per gram
U - Not Detected
(#) - Method Detection Limit

Table O 8. Sample Taxonomy
Midnite Mine Site
Wellpinit, WA

				Functional Group	**Regional**	**Sample ID**											
Taxon					**Tolerance**	266-0063	266-0103	266-0104	266-0105	266-0062	266-0100	266-0101	266-0102	266-0060	266-0111	266-0112	266-0113
Class	Order	Family	Genus			BC-1A	BC-1B	BC-1C	BC-1D	BC-2A	BC-2B	BC-2C	BC-2D	BC-3A	BC-3B	BC-3C	BC-3D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5				1				2				
			Acerpenna	Collector/gatherer	4	5	8	18	1	13	8	3	2	6	2	4	1
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1	4	21	25	23	11	1	5	16	25	23	7	16
			Drunella	Scraper	0	3	11	57	7	4	5	2	3	2	1	1	3
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1				5		1	8	1				2
		Heptageniidae	*Epeorus*	Scraper	0	2	10	3		11	20	6		2	5	9	
			Cinygmula	Scraper	4	44	56	132	4	96	125	46	13	49	78	70	27
			Cinygma	Scraper	4												
		Ameletidae	*Ameletus*	Scraper	0	1			1								
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2				1			1		2			39
			Zapada	Shredder	2				1								3
			Ostrocerca	Shredder	2					4			5	33	9	1	26
		Taeniopterygidae	*Taenionema*	Scraper	2			2	2	4	10	20	17	1	11	2	25
		Chloroperlidae	*Sweltsa*	Predator	1												
		Perlodidae	*Isoperla*	Predator	2		1	1									
		Capniidae	*Eucapnopsis*	Shredder	1												
		Leuctridae	*Paraleuctra*	Shredder	0						1						
			Perlomyia	Shredder	0						1					1	
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4							1			12	15	6
			Parapsyche	Filterer	1			2	1		1						
		Rhyacophilidae	*Rhyacophila*	Predator	0	1	1	6			6		1	1			1
		Lepidostomatidae	*Lepidostoma*	Shredder	1	11		4	1		1	1	3	20	1	2	1
		Brachycentridae	*Micrasema*	Shredder	1												1
		Philopotamidae		Filterer	3												
		Glossosomatidae	*Glossosoma*	Scraper	0			1									
		Uenoidae	*Neophylax*	Scraper	3	4	15	7		1	3	1		1	6	57	4
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4			1	1								
		Limnephilidae	*Chyranda*	Shredder	1	1	1						1	1			3
			immature	Shredder	4			1	1								
			Eocosmosus	Shredder	2								1				
			Clostoeca	Shredder	1												1
			Hesperophylax	Shredder	5												
			Cryptochia	Shredder	0												
		Apataniidae	*Manophylax*	Shredder	4									1			
	Diptera	Chironomidae		Scraper	6	3	3	17	2	7	31	14	4	18	9	5	8
		Tipulidae	*Tipula*	Shredder	4				1								
			Ormosia	Collector-gatherer	3			1							24		
			Dicranota	Predator	3							2					
			Limonia	Shredder	6									2	2		
			Pedicia	Predator	6												
		Psychodidae	*Pericoma*	Collector-gatherer	4	1	1	2	2	4	1		5	8			2
		Simuliidae	*Simulium*	Collector-filterer	6				1			4	4	13	6	2	3
			Prosimulium	Collector-filterer	3		1	5		388	1040	38	7	20	140	6	15
		Tabanidae	*Tabanus*	Predator	5												
		Blephariceridae	*Philorus*	Scraper	0					2	6						
		Dixidae	*Dixa*	Collector-gatherer	1												
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5	1				1							
		Hydrophilidae	*Crenetis*	Predator	5												
			Enochrus	Shredder	5												1
		Elmidae	*Narpus*	Scraper	4		1	13		1	4			1	18	1	
			Optioservus	Scraper	4		1	2		11	10	7	1	2	9	8	
			Zaitzevia	Scraper	4						3						
			Heterlimnius	Scraper	4	7	16	96	2	15	17	25	3	12	30	15	6
			Lara	Shredder	4		2				1	7		1	1		1
		Gyrinidae	*Gyrinus*	Predator	5												
		Amphizoidae	*Amphizoa*	Predator	1												
Oligochaeta				Deposit Feeder	5	8	15	31	4	6	2	20	2	6	5	1	4
Nematoda				Parasite	5						1						
Mollusca	Gastropoda	Physidae		Scraper	8	4		2	15	1	7	8	2	9	9	12	6
		Lymnaeidae		Scraper	6												
		Planorbidae		Scraper	7				2			1					
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8	4	14	5			1		1	3	2	5	2
Hirudinea				Predator	10			1						1			
Turbellaria	Tricladida	Planariidae		Scraper	1	1	4	12	21			2	2	1	3		3

Table 0 8. Sample Taxonomy, Continued
Midnite Mine Site
Wellpinit, WA

Taxon				Functional Group	Regional Tolerance	Sample ID											
						A00521	A00522	A00523	A00524	266-0058	266-0120	266-0121	266-0122	266-0039	266-0126	266-0127	266-0128
Class	Order	Family	Genus			BC-4A	BC-4B	BC-4C	BC-4D	BC-5A	BC-5B	BC-5C	BC-5D	BC-6A	BC-6B	BC-6C	BC-6D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5												
			Acerpenna	Collector/gatherer	4	1								1			1
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1												
			Drunella	Scraper	0												
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1												
		Heptageniidae	*Epeorus*	Scraper	0			1		2		2					
			Cinygmula	Scraper	4		3			2							
			Cinygma	Scraper	4												
		Ameletidae	*Ameletus*	Scraper	0								2				
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2				21	3	11		11				
			Zapada	Shredder	2	7	1		7	1	5		4				
			Ostrocerca	Shredder	2	4	2	1	26	14	10	1	99	2			10
		Taeniopterygidae	*Taenionema*	Scraper	2	10	12	6	70	85	110	17	70	7			2
		Chloroperlidae	*Sweltsa*	Predator	1												
		Perlodidae	*Isoperla*	Predator	2												
		Capniidae	*Eucapnopsis*	Shredder	1				1		3		6	1			
		Leuctridae	*Paraleuctra*	Shredder	0												
			Perylomia	Shredder	0	1				1							1
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4	99	41	2	3	12	29	15		1		1	2
			Parapsyche	Filterer	1							1					
		Rhyacophilidae	*Rhyacophila*	Predator	0	10	2			8	1	1	2	1			
		Lepidostomatidae	*Lepidostoma*	Shredder	1				8		1		1				
		Philopotamidae		Filterer	3												
		Glossosomatidae	*Glossosoma*	Scraper	0												
		Uenoidae	*Neophylax*	Scraper	3	8	89	147	3	13	5	12	1				
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4												1
		Limnephilidae	*Chyranda*	Shredder	1						1	1	4				
			immature	Shredder	4				1				1				
			Eocosmosus	Shredder	2				1				1				1
			Costoeca	Shredder	1												
			Hesperophylax	Shredder	5					1				1		3	2
			Cryptochia	Shredder	0												
		Apataniidae	*Manophylax*	Shredder	4												
	Diptera	Chironomidae		Scraper	6	27	24	19	92	30	29	5	30	30	5	1	20
		Tipulidae	*Tipula*	Shredder	4												
			Ormosia	Collector-gatherer	3	5	7	2	1	6		2					
			Dicranota	Predator	3			1	1		1		1				
			Limonia	Shredder	6	2											
			Pedicia	Predator	6							1					
		Psychodidae	*Pericoma*	Collector-gatherer	4				1								
		Simuliidae	*Simulium*	Collector-filterer	6						3						
			Prosimulium	Collector-filterer	3	224	44	4	76	2344	319	124	24	226	55	29	426
		Tabanidae	*Tabanus*	Predator	5						1						
		Blephariceridae	*Philorus*	Scraper	0					3							
		Dixidae	*Dixa*	Collector-gatherer	1												
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5							1					
		Hydrophilidae	*Crenetis*	Predator	5												
		Elmidae	*Narpus*	Scraper	4	1				3		1			1	1	
			Optioservus	Scraper	4	42	47	12	3	12	21	28	3	3	2	1	1
			Zaitzevia	Scraper	4	1	2				1						
			Heterlimnius	Scraper	4	1	1	1	2	6	8	4	1	1			
			Lara	Shredder	4												
		Gyrinidae	*Gyrinus*	Predator	5								1				
		Amphizoidae	*Amphizoa*	Predator	1												
Oligochaeta				Deposit Feeder	5	4		4	2	25	7	6		15	2		3
Nematoda				Parasite	5					1							
Mollusca	Gastropoda	Physidae		Scraper	8	13	8	10	29	2	9	7	9	3		1	5
		Lymnaeidae		Scraper	6												
		Planorbidae		Scraper	7		1										
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8												1
Hirudinea				Predator	10												
Turbellaria	Tricladida	Planariidae		Scraper	1	2		2		2	1		1				

Table O 8. Sample Taxonomy, Continued
Midnite Mine Site
Wellpinit, WA

				Functional Group	Regional	Sample ID							
Taxon					**Tolerance**	266-0061	266-0114	266-0115	266-0116	266-0064	266-0107	266-0108	266-0109
Class	Order	Family	Genus			ED-1A	ED-1B	ED-1C	ED-1D	REF-1A	REF-1B	REF-1C	REF-1D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5								
			Acerpenna	Collector/gatherer	4					1	4	2	4
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1					15	28	5	6
			Drunella	Scraper	0					17	39	13	10
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1								
		Heptageniidae	*Epeorus*	Scraper	0					31	12	19	13
			Cinygmula	Scraper	4					9	35	7	5
			Cinygma	Scraper	4					11		11	8
		Ameletidae	*Ameletus*	Scraper	0								
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2	129	103	76	14				
			Zapada	Shredder	2	26	20	7	2	18	2	14	2
			Ostrocerca	Shredder	2	363	202	113	25	3			
		Taeniopterygidae	*Taenionema*	Scraper	2	1			1	3	1	3	
		Chloroperlidae	*Sweltsa*	Predator	1					4		4	1
		Perlodidae	*Isoperla*	Predator	2					2	1	1	2
		Capniidae	*Eucapnopsis*	Shredder	1								
		Leuctridae	*Paraleuctra*	Shredder	0					11		3	1
			Perylomia	Shredder	0					1			2
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4		1	7					
			Parapsyche	Filterer	1	14	5	23	2		1	2	
		Rhyacophilidae	*Rhyacophila*	Predator	0					14	8	7	6
		Lepidostomatidae	*Lepidostoma*	Shredder	1		1			2			
		Philopotamidae		Filterer	3							1	
		Glossosomatidae	*Glossosoma*	Scraper	0						4		5
		Uenoidae	*Neophylax*	Scraper	3								
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4								
		Limnephilidae	*Chyranda*	Shredder	1					3		2	
			immature	Shredder	4						1	1	
			Eocosmosus	Shredder	2				3				1
			Clostoeca	Shredder	1							1	
			Hesperophylax	Shredder	5								
			Cryptochia	Shredder	0							2	
		Apataniidae	*Manophylax*	Shredder	4								
	Diptera	Chironomidae		Scraper	6	11	17	8	2	6	1	1	2
		Tipulidae	*Tipula*	Shredder	4					1			
			Ormosia	Collector-gatherer	3	16	1		1				
			Dicranota	Predator	3	5	5		1	1		3	1
			Limonia	Shredder	6	13	2	1	1				
			Pedicia	Predator	6								
		Psychodidae	*Pericoma*	Collector-gatherer	4					1			
		Simuliidae	*Simulium*	Collector-filterer	6								
			Prosimulium	Collector-filterer	3					10	2	6	5
		Tabanidae	*Tabanus*	Predator	5								
		Blephariceridae	*Philorus*	Scraper	0								
		Dixidae	*Dixa*	Collector-gatherer	1	1			1				
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5								
		Hydrophilidae	*Crenetis*	Predator	5					1			
		Elmidae	*Narpus*	Scraper	4								
			Optioservus	Scraper	4		2						
			Zaitzevia	Scraper	4								
			Heterlimnius	Scraper	4	11	6	1	1	2	2	2	1
			Lara	Shredder	4					25		19	7
		Gyrinidae	*Gyrinus*	Predator	5								
		Amphizoidae	*Amphizoa*	Predator	1					1			
Oligochaeta				Deposit Feeder	5	1				4	6	1	1
Mollusca	Gastropoda	Physidae		Scraper	8								
		Lymnaeidae		Scraper	6								
		Planorbidae		Scraper	7								
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8								
Hirudinea				Predator	10								
Turbellaria	Tricladida	Planariidae		Scraper	1						2		

Table O 9. Sample Metrics
Midnite Mine Site
Wellpinit, WA

	Sample ID											
	266-0063	266-0103	266-0104	266-0105	266-0062	266-0100	266-0101	266-0102	266-0060	266-0111	266-0112	266-0113
Metric	BC-1A	BC-1B	BC-1C	BC-1D	BC-2A	BC-2B	BC-2C	BC-2D	BC-3A	BC-3B	BC-3C	BC-3D
Total Number of Organisms	105	182	447	100	580	1307	222	96	241	406	224	210
Number of Taxa	18	19	26	23	18	26	22	22	27	23	20	27
Functional Feeding Groups												
Scrapers	69	117	344	56	153	241	132	45	98	179	180	82
Filterers	4	15	12	2	388	1042	43	12	36	160	28	26
Scrapers:Filterers	17.25	7.80	28.67	28.00	0.39	0.23	3.07	3.75	2.72	1.12	6.43	3.15
Shredders	13	3	5	5	5	4	9	10	60	13	4	76
Shredders:Total	0.12	0.02	0.01	0.05	0.01	0.00	0.04	0.10	0.25	0.03	0.02	0.36
EPT Abundance	76	124	260	50	144	183	94	65	144	148	169	159
Chironomid Abundance	3	3	17	2	7	31	14	4	18	9	5	8
EPT:Chironomid	25.33	41.33	15.29	25.00	20.57	5.90	6.71	16.25	8.00	16.44	33.80	19.88
% Contribution Dominant Taxon	41.90	30.77	29.53	23.00	66.90	79.57	20.72	17.71	20.33	34.48	31.25	18.57
EPT Index	10	9	14	14	8	13	11	12	13	10	11	16
H' Diversity	3.12	3.32	3.25	3.52	1.84	1.34	3.61	3.83	3.78	3.28	3.13	3.85
H Max	4.17	4.25	4.70	4.52	4.17	4.70	4.46	4.46	4.75	4.52	4.32	4.75
Hillsenhoff's Biotic Index	3.7	3.4	3.3	2.8	3.2	3.1	3.7	2.9	3.5	3.4	3.7	2.8

	Sample ID											
	A00521	A00522	A00523	A00524	266-0058	266-0120	266-0121	266-0122	266-0039	266-0126	266-0127	266-0128
Metric	BC-4A	BC-4B	BC-4C	BC-4D	BC-5A	BC-5B	BC-5C	BC-5D	BC-6A	BC-6B	BC-6C	BC-6D
Total Number of Organisms	462	284	212	348	2576	576	229	272	292	65	37	476
Number of Taxa	19	15	14	19	22	21	18	20	13	5	7	14
Functional Feeding Groups												
Scrapers	105	187	198	199	160	184	76	117	44	8	4	28
Filterers	323	85	6	79	2356	351	140	24	227	55	30	429
Scrapers:Filterers	0.33	2.20	33.00	2.52	0.07	0.52	0.54	4.88	0.19	0.15	0.13	0.07
Shredders	14	3	1	65	20	31	3	127	4	0	3	14
Shredders:Total	0.03	0.01	0.00	0.19	0.01	0.05	0.01	0.47	0.01	0.00	0.08	0.03
EPT Abundance	140	150	157	141	142	176	50	202	14	0	4	20
Chironomid Abundance	27	24	19	92	30	29	5	30	30	5	1	20
EPT:Chironomid	5.19	6.25	8.26	1.53	4.73	6.07	10.00	6.73	0.47	0.00	4.00	1.00
% Contribution Dominant Family	48.48	31.34	69.34	26.44	90.99	55.38	54.15	36.40	77.40	84.62	78.38	89.50
EPT Index	8	7	5	10	11	10	8	12	7	0	2	8
H' Diversity	2.47	2.85	1.82	2.92	0.73	2.31	2.48	2.76	1.33	0.89	1.27	0.78
H Max	4.25	3.91	3.81	4.25	4.46	4.39	4.17	4.32	3.70	2.32	2.81	3.81
Hillsenhoff's Biotic Index	3.5	3.7	3.5	3.8	3.0	3.1	3.4	2.7	3.4	3.3	3.5	3.2

	Sample ID							
	266-0061	266-0114	266-0115	266-0116	266-0064	266-0107	266-0108	266-0109
Metric	ED-1A	ED-1B	ED-1C	ED-1D	REF-1A	REF-1B	REF-1C	REF-1D
Total Number of Organisms	591	365	236	54	197	149	130	83
Number of Taxa	12	12	8	12	26	17	24	20
Functional Feeding Groups								
Scrapers	23	25	9	4	79	96	56	44
Filterers	14	6	30	2	10	3	9	5
Scrapers:Filterers	1.64	4.17	0.30	2.00	7.90	32.00	6.22	8.80
Shredders	531	328	197	45	64	3	42	13
Shredders:Total	0.90	0.90	0.83	0.83	0.32	0.02	0.32	0.16
EPT Abundance	533	332	226	47	145	136	98	66
Chironomid Abundance	11	17	8	2	6	1	1	2
EPT:Chironomid	48.45	19.53	28.25	23.50	24.17	136.00	98.00	33.00
% Contribution Dominant Family	61.42	55.34	47.88	46.30	15.74	26.17	14.62	15.66
EPT Index	5	6	5	6	16	12	18	14
H' Diversity	1.82	1.84	1.90	2.42	3.99	3.01	3.95	3.88
H Max	3.58	3.58	3.00	3.58	4.70	4.09	4.58	4.32
Hillsenhoff's Biotic Index	2.2	2.3	2.1	2.2	1.9	1.7	2.0	1.8

Table O 10. Presence-Absence of Family Taxa for Each Station (+ = presence, - = absence)
Midnite Mine Site
Wellpinit, WA

Taxon	BC-1	BC-2	BC-3	BC-4	BC-5	BC-6	ED-1	REF-1
Ephemeroptera								
Ameletidae	+	-	-	-	+	-	-	-
Baetidae	+	+	+	+	-	+	-	+
Ephemerellidae	+	+	+	-	-	-	-	+
Heptageniidae	+	+	+	+	-	-	+	
Leptophlebiidae	+	+	+	-	-	-	-	+
Plecoptera								
Capniidae	-	-	-	+	+	+	-	-
Chloroperlidae	+	-	-	-	-	-	+	
Leuctridae	-	+	-	-	+	+	-	+
Nemouridae	+	+	+	+	+	+	+	+
Perlodidae	+	-	-	-	-	-	-	+
Taeniopterygidae	+	+	+	+	+	+	+	+
Trichoptera								
Apataniidae	-	-	+	-	-	-	-	-
Brachycentridae	-	-	+	-	-	-	-	-
Glossosomatidae	+	-	-	-	-	-	-	+
Hydropsychidae	+	+	+	+	+	+	+	+
Hydroptilidae	+	-	-	-	-	+	-	-
Lepidostomatidae	+	+	+	+	+		+	+
Limnephilidae	+	+	+	+	+	+	+	+
Philopotamidae	-	-	-	-	-	-	-	+
Rhyacophilidae	+	+	+	+	+	+	-	+
Uenoidae	+	+	+	+	+	-	-	-
Diptera								
Blephariceridae	-	+	-	-	+	-	-	-
Chironomidae	+	+	+	+	+	+	+	+
Dixidae	-	-	-	-	-	-	+	-
Psychodidae	+	+	+	+	-	-	-	+
Simuliidae	+	+	+	+	+	+	-	+
Tabanidae	-	-	-	-	+	-	-	-
Tipulidae	+	+	+	+	+	-	+	+
Coleoptera								
Amphizoidae	-	-	-	-	-	-	-	+
Elmidae	+	+	+	+	+	+	+	+
Gyrinidae	-	-	-	-	+	-	-	-
Helophoridae	+	+	+	-	+	-	-	-
Hydrophilidae	-	-	+	-	-	-	-	+
Hirudinea	+	-	+	-	-	-	-	+
Mollusca	+	+	+	+	+	+	-	-
Nematoda	-	+	+	-	+	+	-	-
Oligochaeta	+	+	+	+	+	+	+	+
Turbellaria	+	+	+	+	+	-	-	+

Table O 11. Sorenson's Similarity Coefficient Values for Paired Station Combinations
Midnite Mine Site
Wellpinit, WA

	BC-1	BC-2	BC-3	BC-4	BC-5	BC-6	ED-1	REF-1
BC-1	-	0.7297	0.75	0.6364	0.6301	0.4364	0.3774	0.6197
BC-2	-	-	0.75	0.7273	0.7397	0.5455	0.4528	0.6197
BC-3	-	-	-	0.7188	0.6197	0.4906	0.4706	0.5797
BC-4	-	-	-	-	0.7692	0.6383	0.6222	0.5714
BC-5	-	-	-	-	-	0.5556	0.5385	0.5143
BC-6	-	-	-	-	-	-	0.4706	0.3846
ED-1	-	-	-	-	-	-	-	0.4000

Shading shows highest similarity

Table O 12. Jaccard's Coefficient of Similarity
Midnite Mine Site
Wellpinit, WA

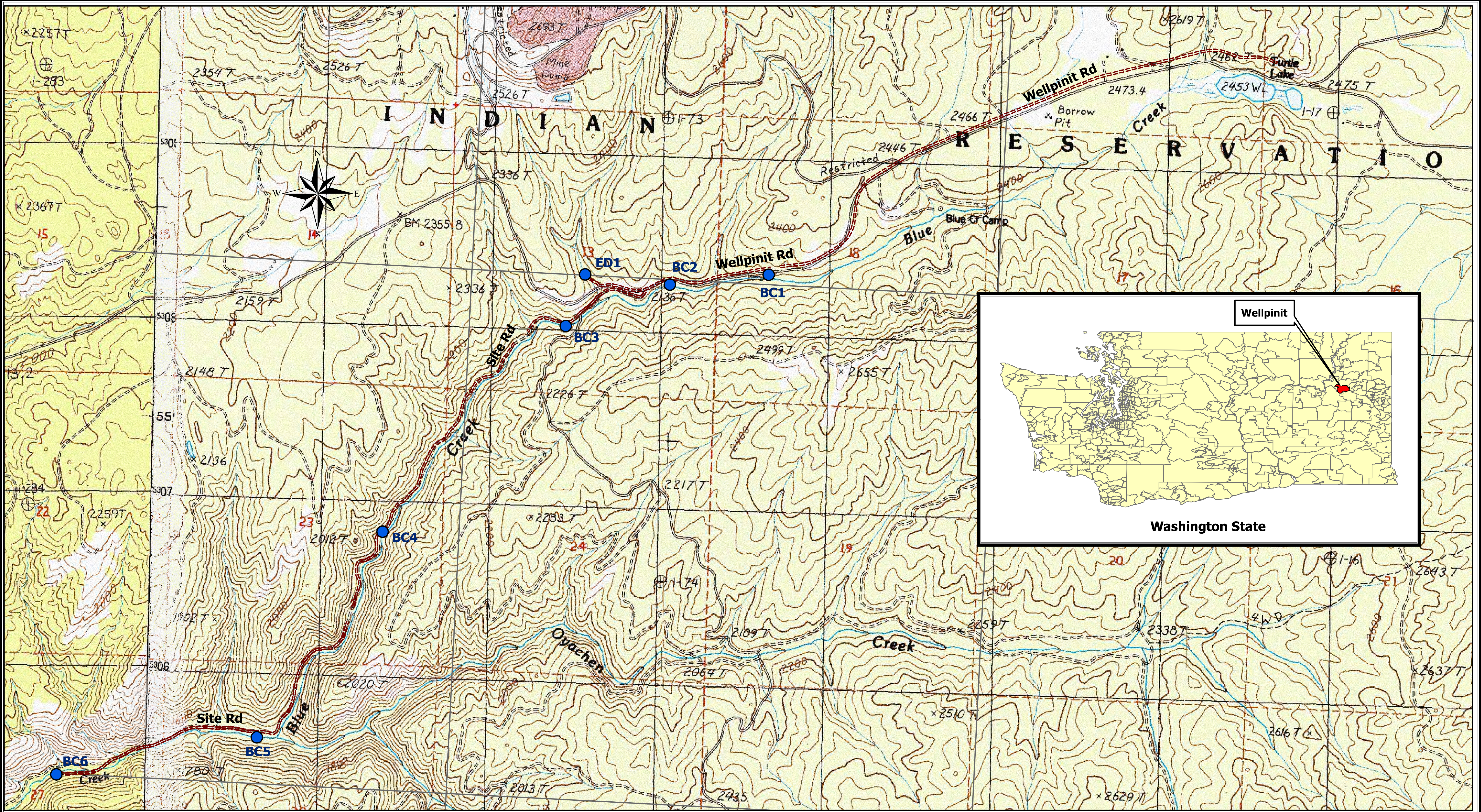
Comparison		Jaccard's		Comparison		Jaccard's
Reference to BC-1		0.47		Upstream to BC-3		0.6
Reference to BC-2		0.45		Upstream to BC-4		0.57
Reference to BC-3		0.4		Upstream to BC-5		0.61
Reference to BC-4		0.4		Upstream to BC-6		0.34
Reference to BC-5		0.35		Upstream to ED-1		0.32
Reference to BC-6		0.24				
Reference to ED-1		0.25				

Jaccard's Coefficient of Similarity Comparing Blue Creek and Eastern Drainage to Rail Creek and Upstream Blue Creek to Downstream Stations and Eastern Drainage.

Table O 13. Community Bioassessment
Midnite Mine Site
Wellpinit, WA

	Station							
Metric	BC-1	BC-2	BC-3	BC-4	BC-5	BC-6	ED-1	REF-1
Average Number of Organisms per Sample	244.7	703.0	290.3	319.3	1127.0	131.3	397.3	158.7
Number of Taxa per Station	37	37	35	29	36	18	16	34
Functional Feeding Groups								
Total Scrapers at Station	530.0	526.0	457.0	490.0	420.0	56.0	57.0	231.0
Total Filterers at Station	31.0	1473.0	224.0	414.0	2847.0	312.0	50.0	22.0
Scrapers:Filterers	17.1	0.4	2.0	1.2	0.1	0.2	1.1	10.5
Total Shredders at Station	5.0	10.0	76.0	65.0	127.0	14.0	45.0	13.0
Shredders:Total	0.05	0.10	0.36	0.19	0.47	0.03	0.83	0.16
EPT Abundance (per Station)	460	421	461	447	368	18	1091	379
Chironomid Abundance (per Station)	23	52	32	70	64	36	36	8
EPT:Chironomid	20.0	8.1	14.4	6.4	5.8	0.5	30.3	47.4
% Contribution Dominant Taxon (average)	34.1	55.7	28.7	49.7	66.8	80.1	54.9	18.8
EPT Index for Station	20	19	19	15	18	10	8	23
H' Diversity (average)	3.2	2.3	3.4	2.4	1.8	1.2	1.9	3.7
Hillsenhoff's Biotic Index (average)	4.4	4.4	4.5	4.0	4.3	2.9	3.4	4.5
Community Loss Index (Relative to REF-1)	0.32	0.3	0.4	0.55	0.44	1.33	1.5	n/a
Community Loss Index (Relative to BC-1)	n/a	0.24	0.31	0.55	0.39	1.39	1.69	n/a
Biological Condition Score (relative to REF-1)	62.5	50	62.5	37.5	41.7	16.7	37.5	n/a
Biological Condition Score (relative to BC-1)	n/a	72.7	86.4	54.5	72.7	40.9	50	n/a
Biological Condition Category (relative to REF-1)	Slight	Moderate	Slight	Moderate	Moderate	Severe	Moderate	n/a
Biological Condition Category (relative to BC-1)	n/a	Slight	Not	Slight	Slight	Moderate	Moderate	n/a

Note: Organism Density, Scraper:Filters, EPT Abundance, EPT/Chironmid, % Dominant Taxon, HBI and Divwersity are based on data from quantitative replicates A-C. Taxa Richness, EPT Index and Community Loss Index are based on all replicates A-D. Shredders:Total is based on qualitative replicate (D) only.



Map created using USGS DRG and DRQ data.
Site survey GPS data also utilized for sample locations.
GPS data collected in Lat, Lon. Decimal Degrees, WGS84.
Map Projection: UTM, Zone 11M
Datum: NAD83
Units: Meters

500 0 500 Meters

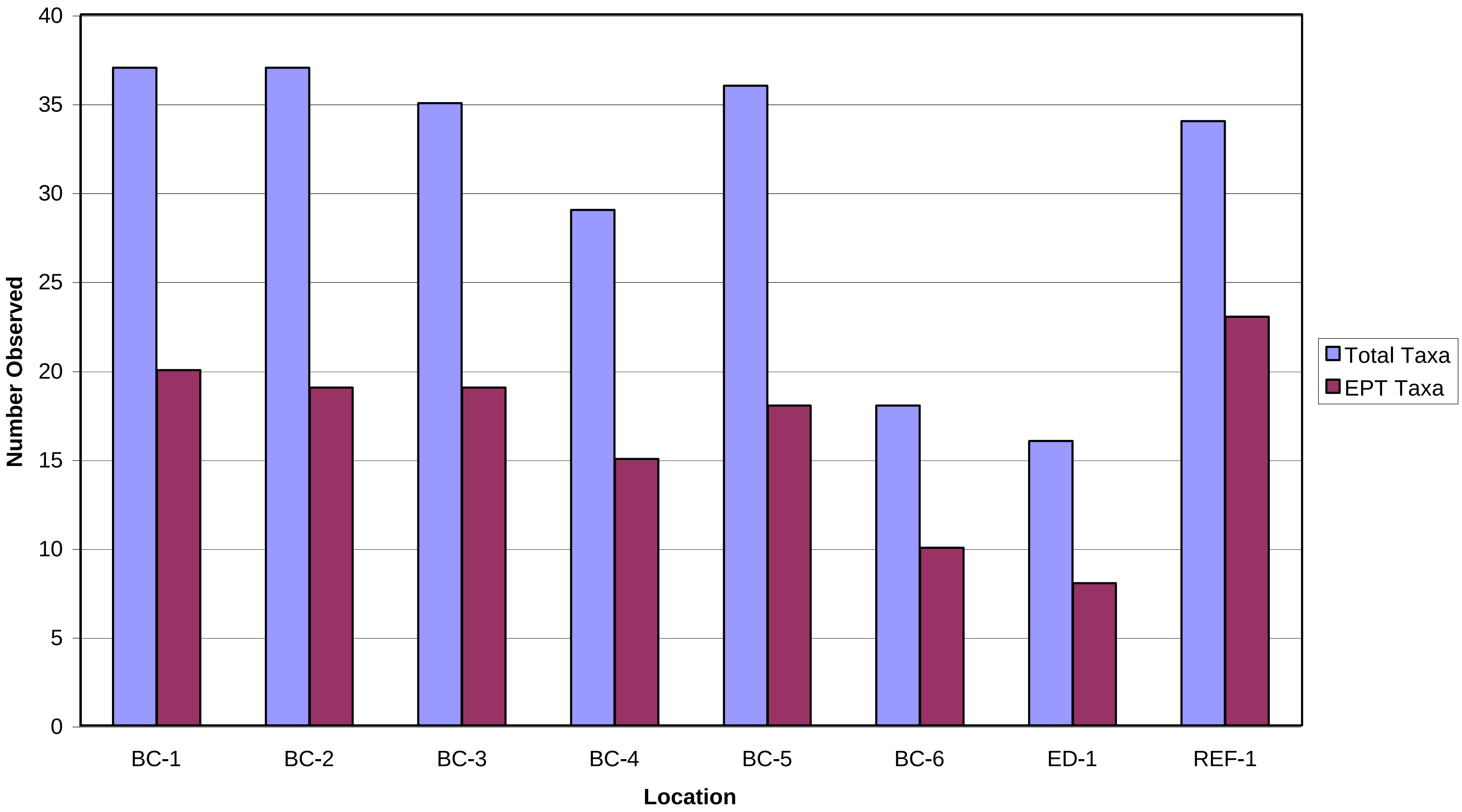
Data: g:/ArcViewProjects\266
.mxd file: g:\ArcInfoProjects\Reac3\R!A00266_MidniteMine
FIG: R1A00266_MidniteMine_f1

LEGEND
- Sample Location
- Wellpinit Road

U.S.EPA Environmental Response Team Center
Response Engineering and Analytical Contract
C68-99-223
W.A. #R1A00266

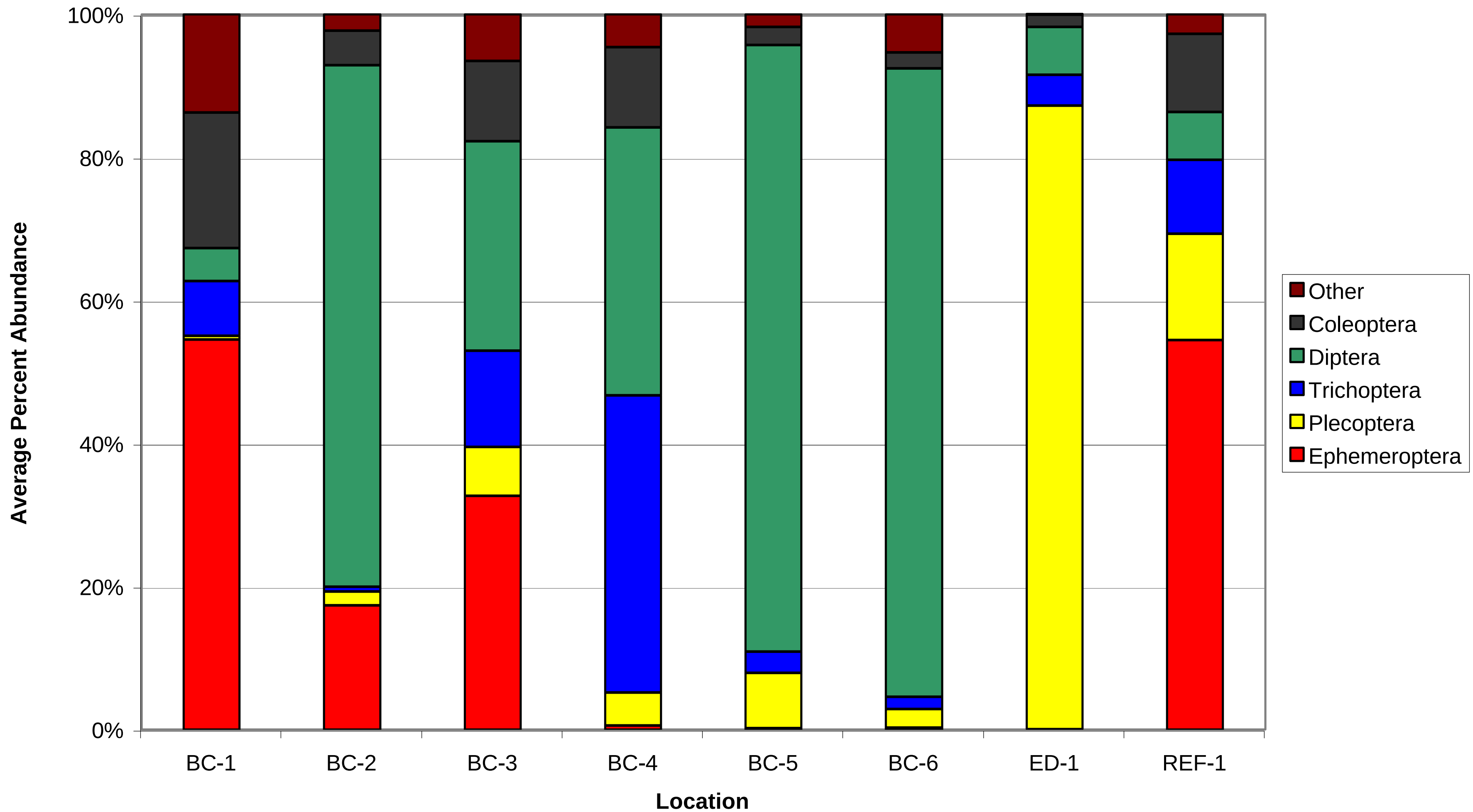
FIGURE 01
SAMPLE LOCATION MAP
MIDNITE MINE SITE
WELLPINIT, WA

Figure O 2. Taxa Richness in Samples
Midnite Mine Site
Wellpinit, WA



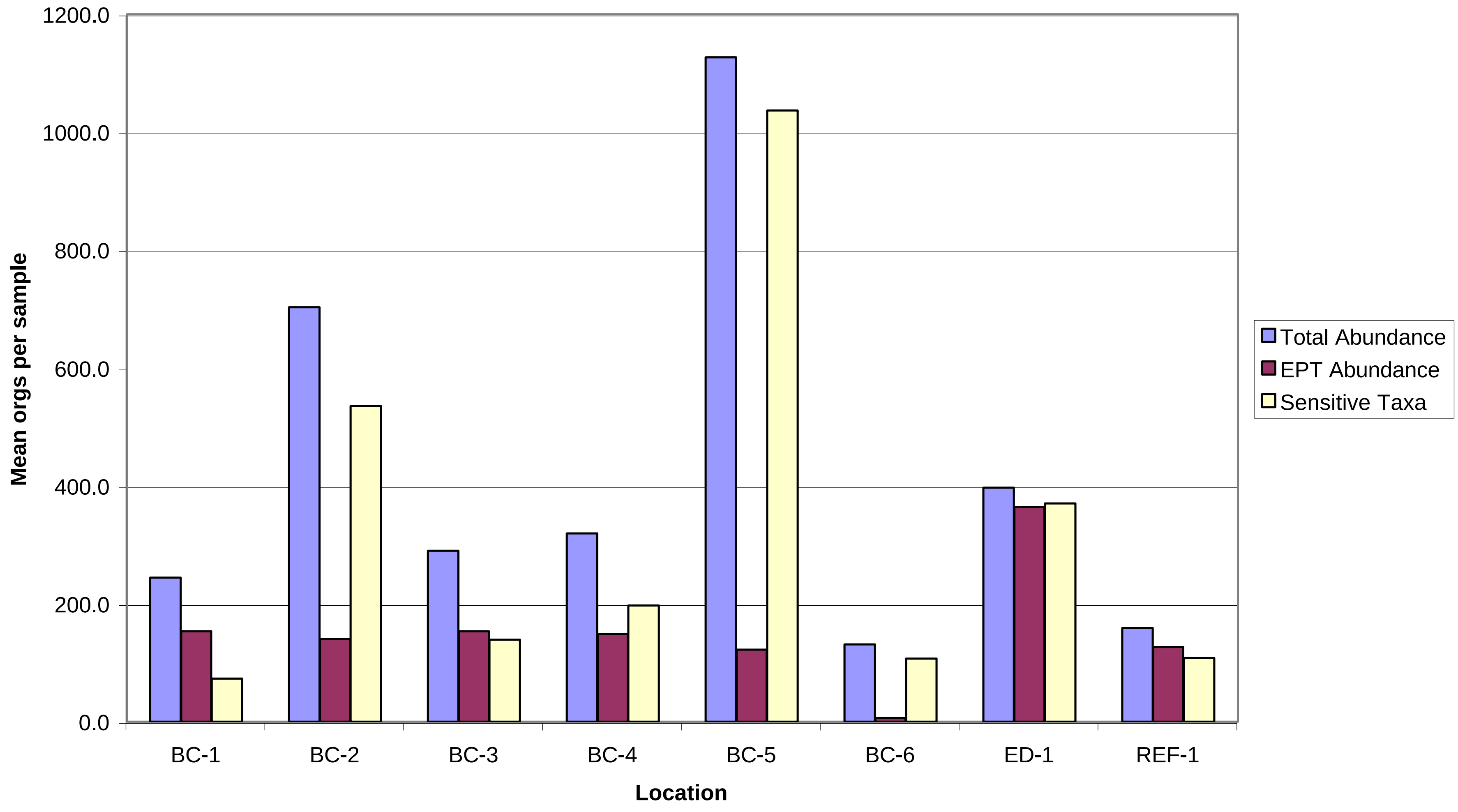
0081-DFR-093005

Figure O 3. Relative Abundance by Taxon
Midnite Mine Site
Wellpinit, WA



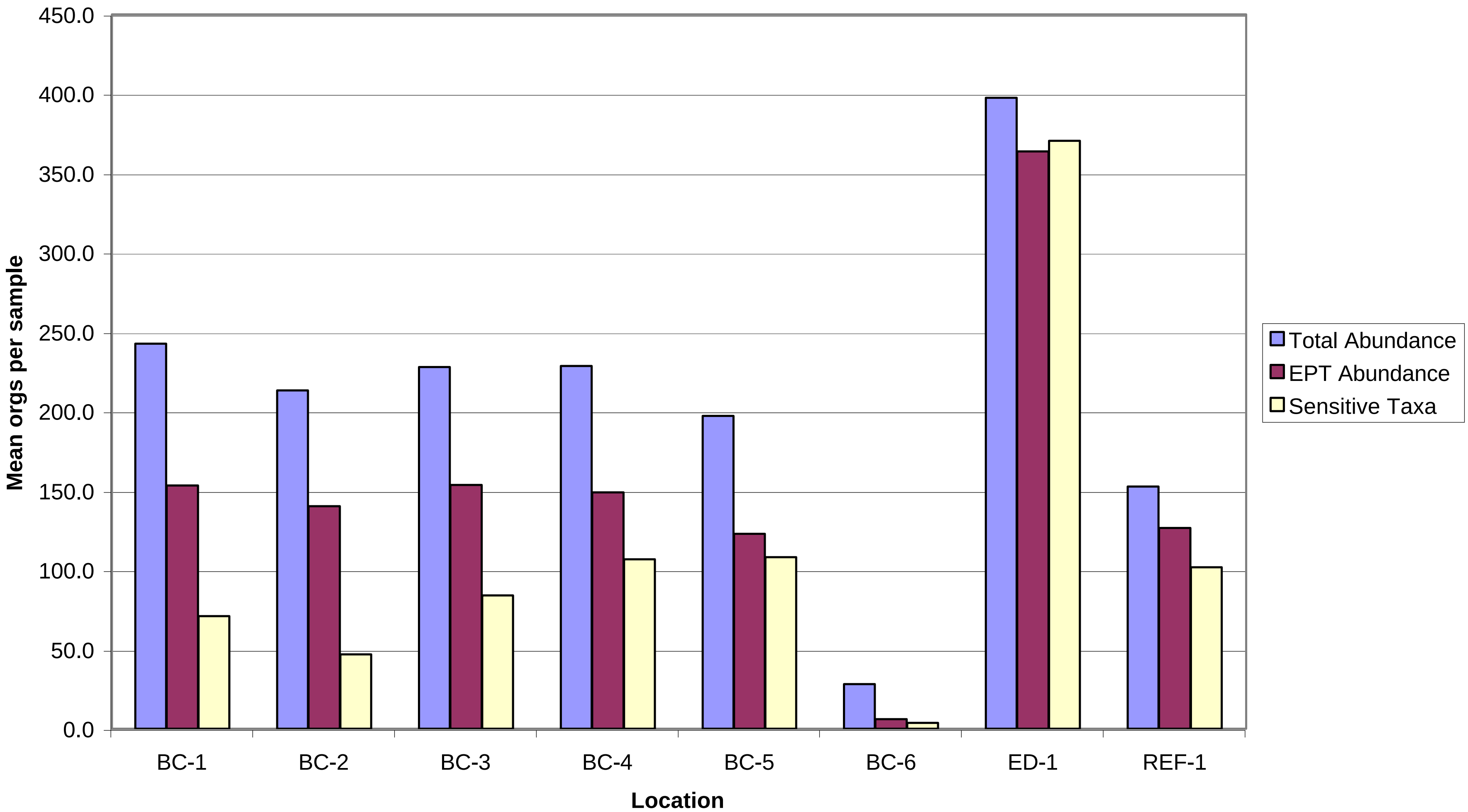
0081-DFR-093005

Figure O 4. Relative Density
Midnite Mine Site
Wellpinit, WA



0081-DFR-093005

Figure O 5. Relative Density (No Simuliidae)
Midnite Mine Site
Wellpinit, WA



0081-DFR-093005

Symbiosis Environmental Client: Lockheed-Martin Location: Midnite Mine, WA

Table 5. Sample Metrics (No Simuliidae)

Bioassessment Report Date: May, 2003

Taxon				Functional Group	Regional Tolerance	Sample ID 266-0063	266-0103	266-0104	266-0105	266-0062	266-0100	266-0101	266-0102	266-0060	266-0111	266-0112	266-0113
Class	Order	Family	Genus			BC-1A	BC-1B	BC-1C	BC-1D	BC-2A	BC-2B	BC-2C	BC-2D	BC-3A	BC-3B	BC-3C	BC-3D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5				1				2				
			Acerpenna	Collector/gatherer	4	5	8	18	1	13	8	3	2	6	2	4	1
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1	4	21	25	23	11	1	5	16	25	23	7	16
			Drunella	Scraper	0	3	11	57	7	4	5	2	3	2	1	1	3
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1				5		1	8	1				2
		Heptageniidae	*Epeorus*	Scraper	0	2	10	3		11	20	6		2	5	9	
			Cinygmula	Scraper	4	44	56	132	4	96	125	46	13	49	78	70	27
			Cinygma	Scraper	4												
		Ameletidae	*Ameletus*	Scraper	0	1			1								
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2				1			1		2			39
			Zapada	Shredder	2				1								3
			Ostrocerca	Shredder	2					4			5	33	9	1	26
		Taeniopterygidae	*Taenionema*	Scraper	2			2	2	4	10	20	17	1	11	2	25
		Chloroperlidae	*Sweltsa*	Predator	1												
		Perlodidae	*Isoperla*	Predator	2		1	1									
		Capniidae	*Eucapnopsis*	Shredder	1												
		Leuctridae	*Paraleuctra*	Shredder	0						1						
			Perlomyia	Shredder	0						1					1	
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4							1			12	15	6
			Parapsyche	Filterer	1			2	1		1						
		Rhyacophilidae	*Rhyacophila*	Predator	0	1	1	6			6		1	1			1
		Lepidostomatidae	*Lepidostoma*	Shredder	1	11		4	1		1	1	3	20	1	2	1
		Brachycentridae	*Micrasema*	Shredder	1												1
		Philopotamidae		Filterer	3												
		Glossosomatidae	*Glossosoma*	Scraper	0			1									
		Uenoidae	*Neophylax*	Scraper	3	4	15	7		1	3	1		1	6	57	4
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4			1	1								
		Limnephilidae	*Chyranda*	Shredder	1	1	1						1	1			3
			immature	Shredder	4			1	1								
			Eocosmosus	Shredder	2								1				
			Clostoeca	Shredder	1												1
			Hesperophylax	Shredder	5												
			Cryptochia	Shredder	0												
		Apataniidae	*Manophylax*	Shredder	4									1			
	Diptera	Chironomidae		Scraper	6	3	3	17	2	7	31	14	4	18	9	5	8
		Tipulidae	*Tipula*	Shredder	4				1								
			Ormosia	Collector-gatherer	3			1							24		
			Dicranota	Predator	3							2					
			Limonia	Shredder	6									2	2		
			Pedicia	Predator	6												
		Psychodidae	*Pericoma*	Collector-gatherer	4	1	1	2	2	4	1		5	8			2
		Tabanidae	*Tabanus*	Predator	5												
		Blephariceridae	*Philorus*	Scraper	0					2	6						
		Dixidae	*Dixa*	Collector-gatherer	1												
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5	1				1							
		Hydrophilidae	*Crenetis*	Predator	5												
			Enochrus	Shredder	5												1
		Elmidae	*Narpus*	Scraper	4		1	13		1	4			1	18	1	
			Optioservus	Scraper	4		1	2		11	10	7	1	2	9	8	
			Zaitzevia	Scraper	4						3						
			Heterlimnius	Scraper	4	7	16	96	2	15	17	25	3	12	30	15	6
			Lara	Shredder	4		2				1	7		1	1		1
		Gyrinidae	*Gyrinus*	Predator	5												
		Amphizoidae	*Amphizoa*	Predator	1												
Oligochaeta				Deposit Feeder	5	8	15	31	4	6	2	20	2	6	5	1	4
Nematoda				Parasite	5						1						
Mollusca	Gastropoda	Physidae		Scraper	8	4		2	15	1	7	8	2	9	9	12	6
		Lymnaeidae		Scraper	6												
		Planorbidae		Scraper	7				2			1					
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8	4	14	5			1		1	3	2	5	2
Hirudinea				Predator	10			1						1			
Turbellaria	Tricladida	Planariidae		Scraper	1	1	4	12	21			2	2	1	3		3

Symbiosis Environmental
Bioassessment Report

Client: Lockheed-Martin
Date: May, 2003

Location: Midnite Mine, WA

Table 5. Sample Metrics (No Simuliidae)

Symbiosis Environmental
Bioassessment Report

Client: Lockheed-Martin
Date: May, 2003

Location: Midnite Mine, WA

Table 1. Sample Taxonomy

Taxon				Functional Group	Regional Tolerance	Sample ID											
						A00521	A00522	A00523	A00524	266-0058	266-0120	266-0121	266-0122	266-0039	266-0126	266-0127	266-0128
Class	Order	Family	Genus			BC-4A	BC-4B	BC-4C	BC-4D	BC-5A	BC-5B	BC-5C	BC-5D	BC-6A	BC-6B	BC-6C	BC-6D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5												
			Acerpenna	Collector/gatherer	4	1								1			1
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1												
			Drunella	Scraper	0												
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1												
		Heptageniidae	*Epeorus*	Scraper	0			1		2		2					
			Cinygmula	Scraper	4		3			2							
			Cinygma	Scraper	4												
		Ameletidae	*Ameletus*	Scraper	0								2				
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2				21	3	11		11				
			Zapada	Shredder	2	7	1		7	1	5		4				
			Ostrocerca	Shredder	2	4	2	1	26	14	10	1	99	2			10
		Taeniopterygidae	*Taenionema*	Scraper	2	10	12	6	70	85	110	17	70	7			2
		Chloroperlidae	*Sweltsa*	Predator	1												
		Perlodidae	*Isoperla*	Predator	2												
		Capniidae	*Eucapnopsis*	Shredder	1				1		3		6	1			
		Leuctridae	*Paraleuctra*	Shredder	0												
			Perylomia	Shredder	0	1				1							1
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4	99	41	2	3	12	29	15		1		1	2
			Parapsyche	Filterer	1							1					
		Rhyacophilidae	*Rhyacophila*	Predator	0	10	2			8	1	1	2	1			
		Lepidostomatidae	*Lepidostoma*	Shredder	1				8		1		1				
		Philopotamidae		Filterer	3												
		Glossosomatidae	*Glossosoma*	Scraper	0												
		Uenoidae	*Neophylax*	Scraper	3	8	89	147	3	13	5	12	1				
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4												1
		Limnephilidae	*Chyranda*	Shredder	1						1	1	4				
			immature	Shredder	4				1				1				
			Eocosmosus	Shredder	2				1				1				1
			Costoeca	Shredder	1												
			Hesperophylax	Shredder	5					1				1		3	2
			Cryptochia	Shredder	0												
		Apataniidae	*Manophylax*	Shredder	4												
	Diptera	Chironomidae		Scraper	6	27	24	19	92	30	29	5	30	30	5	1	20
		Tipulidae	*Tipula*	Shredder	4												
			Ormosia	Collector-gatherer	3	5	7	2	1	6		2					
			Dicranota	Predator	3			1	1		1		1				
			Limonia	Shredder	6	2											
			Pedicia	Predator	6							1					
		Psychodidae	*Pericoma*	Collector-gatherer	4				1								
		Tabanidae	*Tabanus*	Predator	5						1						
		Blephariceridae	*Philorus*	Scraper	0					3							
		Dixidae	*Dixa*	Collector-gatherer	1												
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5							1					
		Hydrophilidae	*Crenetis*	Predator	5												
		Elmidae	*Narpus*	Scraper	4	1				3		1			1	1	
			Optioservus	Scraper	4	42	47	12	3	12	21	28	3	3	2	1	1
			Zaitzevia	Scraper	4	1	2				1						
			Heterlimnius	Scraper	4	1	1	1	2	6	8	4	1	1			
			Lara	Shredder	4												
		Gyrinidae	*Gyrinus*	Predator	5								1				
		Amphizoidae	*Amphizoa*	Predator	1												
Oligochaeta				Deposit Feeder	5	4		4	2	25	7	6		15	2		3
Nematoda				Parasite	5					1							
Mollusca	Gastropoda	Physidae		Scraper	8	13	8	10	29	2	9	7	9	3		1	5
		Lymnaeidae		Scraper	6												
		Planorbidae		Scraper	7		1										
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8												1
Hirudinea				Predator	10												
Turbellaria	Tricladida	Planariidae		Scraper	1	2		2		2	1		1				

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Table 5. Sample Metrics (No Simuliidae)

Taxon				Functional Group	Regional Tolerance	Sample ID							
						266-0061	266-0114	266-0115	266-0116	266-0064	266-0107	266-0108	266-0109
Class	Order	Family	Genus			ED-1A	ED-1B	ED-1C	ED-1D	REF-1A	REF-1B	REF-1C	REF-1D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5								
			Acerpenna	Collector/gatherer	4					1	4	2	4
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1					15	28	5	6
			Drunella	Scraper	0					17	39	13	10
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1								
		Heptageniidae	*Epeorus*	Scraper	0					31	12	19	13
			Cinygmula	Scraper	4					9	35	7	5
			Cinygma	Scraper	4					11		11	8
		Ameletidae	*Ameletus*	Scraper	0								
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2	129	103	76	14				
			Zapada	Shredder	2	26	20	7	2	18	2	14	2
			Ostrocerca	Shredder	2	363	202	113	25	3			
		Taeniopterygidae	*Taenionema*	Scraper	2	1			1	3	1	3	
		Chloroperlidae	*Sweltsa*	Predator	1					4		4	1
		Perlodidae	*Isoperla*	Predator	2					2	1	1	2
		Capniidae	*Eucapnopsis*	Shredder	1								
		Leuctridae	*Paraleuctra*	Shredder	0					11		3	1
			Perylomia	Shredder	0					1			2
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4		1	7					
			Parapsyche	Filterer	1	14	5	23	2		1	2	
		Rhyacophilidae	*Rhyacophila*	Predator	0					14	8	7	6
		Lepidostomatidae	*Lepidostoma*	Shredder	1		1			2			
		Philopotamidae		Filterer	3							1	
		Glossosomatidae	*Glossosoma*	Scraper	0						4		5
		Uenoidae	*Neophylax*	Scraper	3								
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4								
		Limnephilidae	*Chyranda*	Shredder	1					3		2	
			immature	Shredder	4						1	1	
			Eocosmosus	Shredder	2				3				1
			Clostoeca	Shredder	1							1	
			Hesperophylax	Shredder	5								
			Cryptochia	Shredder	0							2	
		Apataniidae	*Manophylax*	Shredder	4								
	Diptera	Chironomidae		Scraper	6	11	17	8	2	6	1	1	2
		Tipulidae	*Tipula*	Shredder	4					1			
			Ormosia	Collector-gatherer	3	16	1		1				
			Dicranota	Predator	3	5	5		1	1		3	1
			Limonia	Shredder	6	13	2	1	1				
			Pedicia	Predator	6								
		Psychodidae	*Pericoma*	Collector-gatherer	4					1			
		Tabanidae	*Tabanus*	Predator	5								
		Blephariceridae	*Philorus*	Scraper	0								
		Dixidae	*Dixa*	Collector-gatherer	1	1			1				
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5								
		Hydrophilidae	*Crenetis*	Predator	5					1			
		Elmidae	*Narpus*	Scraper	4								
			Optioservus	Scraper	4		2						
			Zaitzevia	Scraper	4								
			Heterlimnius	Scraper	4	11	6	1	1	2	2	2	1
			Lara	Shredder	4					25		19	7
		Gyrinidae	*Gyrinus*	Predator	5								
		Amphizoidae	*Amphizoa*	Predator	1					1			
Oligochaeta				Deposit Feeder	5	1				4	6	1	1
Mollusca	Gastropoda	Physidae		Scraper	8								
		Lymnaeidae		Scraper	6								
		Planorbidae		Scraper	7								
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8								
Hirudinea				Predator	10								
Turbellaria	Tricladida	Planariidae		Scraper	1						2		

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Table 5. Sample Metrics (No Simuliidae)

	Sample ID											
	266-0063	266-0103	266-0104	266-0105	266-0062	266-0100	266-0101	266-0102	266-0060	266-0111	266-0112	266-0113
Metric	BC-1A	BC-1B	BC-1C	BC-1D	BC-2A	BC-2B	BC-2C	BC-2D	BC-3A	BC-3B	BC-3C	BC-3D
Total Number of Organisms	105	181	442	99	192	267	180	85	208	260	216	192
Number of Taxa	18	18	25	22	17	25	20	20	25	21	18	25
Functional Feeding Groups												
Scrapers	69	117	344	56	153	241	132	45	98	179	180	82
Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Scrapers:Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Shredders	13	3	5	5	5	4	9	10	60	13	4	76
Shredders:Total	0.12	0.02	0.01	0.05	0.03	0.01	0.05	0.12	0.29	0.05	0.02	0.40
EPT Abundance	76	124	260	50	144	183	94	65	144	148	169	159
Chironomid Abundance	3	3	17	2	7	31	14	4	18	9	5	8
EPT:Chironomid	25.33	41.33	15.29	25.00	20.57	5.90	6.71	16.25	8.00	16.44	33.80	19.88
% Contribution Dominant Taxon	41.90	30.94	29.86	23.23	50.00	46.82	25.56	20.00	23.56	30.00	32.41	20.31
EPT Index	10	9	14	14	8	13	11	12	13	10	11	16
H' Diversity	3.12	3.29	3.20	3.48	2.78	3.00	3.48	3.62	3.56	3.52	2.99	3.69
H Max	4.17	4.17	4.64	4.46	4.09	4.64	4.32	4.32	4.64	4.39	4.17	4.64
Hillsenhoff's Biotic Index	3.7	3.4	3.3	2.8	3.5	3.6	3.8	2.7	3.4	3.6	3.7	2.8

	Sample ID											
	A00521	A00522	A00523	A00524	266-0058	266-0120	266-0121	266-0122	266-0039	266-0126	266-0127	266-0128
Metric	BC-4A	BC-4B	BC-4C	BC-4D	BC-5A	BC-5B	BC-5C	BC-5D	BC-6A	BC-6B	BC-6C	BC-6D
Total Number of Organisms	238	240	208	272	232	254	105	248	66	10	8	50
Number of Taxa	18	14	13	18	21	19	17	19	12	4	6	13
Functional Feeding Groups												
Scrapers	105	187	198	199	160	184	76	117	44	8	4	28
Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Scrapers:Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Shredders	14	3	1	65	20	31	3	127	4	0	3	14
Shredders:Total	0.06	0.01	0.00	0.24	0.09	0.12	0.03	0.51	0.06	0.00	0.38	0.28
EPT Abundance	140	150	157	141	142	176	50	202	14	0	4	20
Chironomid Abundance	27	24	19	92	30	29	5	30	30	5	1	20
EPT:Chironomid	5.19	6.25	8.26	1.53	4.73	6.07	10.00	6.73	0.47	0.00	4.00	1.00
% Contribution Dominant Family	41.60	37.08	70.67	33.82	36.64	43.31	26.67	39.92	45.45	50.00	37.50	40.00
EPT Index	8	7	5	10	11	10	8	12	7	0	2	8
H' Diversity	2.85	2.64	1.72	2.77	3.23	2.90	3.24	2.55	2.45	1.76	2.41	2.80
H Max	4.17	3.81	3.70	4.17	4.39	4.25	4.09	4.25	3.58	2.00	2.58	3.70
Hillsenhoff's Biotic Index	4.0	3.8	3.6	4.1	3.2	3.2	3.8	2.7	5.0	5.2	5.1	4.8

	Sample ID							
	266-0061	266-0114	266-0115	266-0116	266-0064	266-0107	266-0108	266-0109
Metric	ED-1A	ED-1B	ED-1C	ED-1D	REF-1A	REF-1B	REF-1C	REF-1D
Total Number of Organisms	591	365	236	54	187	147	124	78
Number of Taxa	12	12	8	12	25	16	23	19
Functional Feeding Groups								
Scrapers	23	25	9	4	79	96	56	44
Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Scrapers:Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Shredders	531	328	197	45	64	3	42	13
Shredders:Total	0.90	0.90	0.83	0.83	0.34	0.02	0.34	0.17
EPT Abundance	533	332	226	47	145	136	98	66
Chironomid Abundance	11	17	8	2	6	1	1	2
EPT:Chironomid	48.45	19.53	28.25	23.50	24.17	136.00	98.00	33.00
% Contribution Dominant Family	61.42	55.34	47.88	46.30	16.58	26.53	15.32	16.67
EPT Index	5	6	5	6	16	12	18	14
H' Diversity	1.82	1.84	1.90	2.42	3.90	2.95	3.86	3.78
H Max	3.58	3.58	3.00	3.58	4.64	4.00	4.52	4.25
Hillsenhoff's Biotic Index	2.2	2.3	2.1	2.2	1.8	1.7	1.9	1.8

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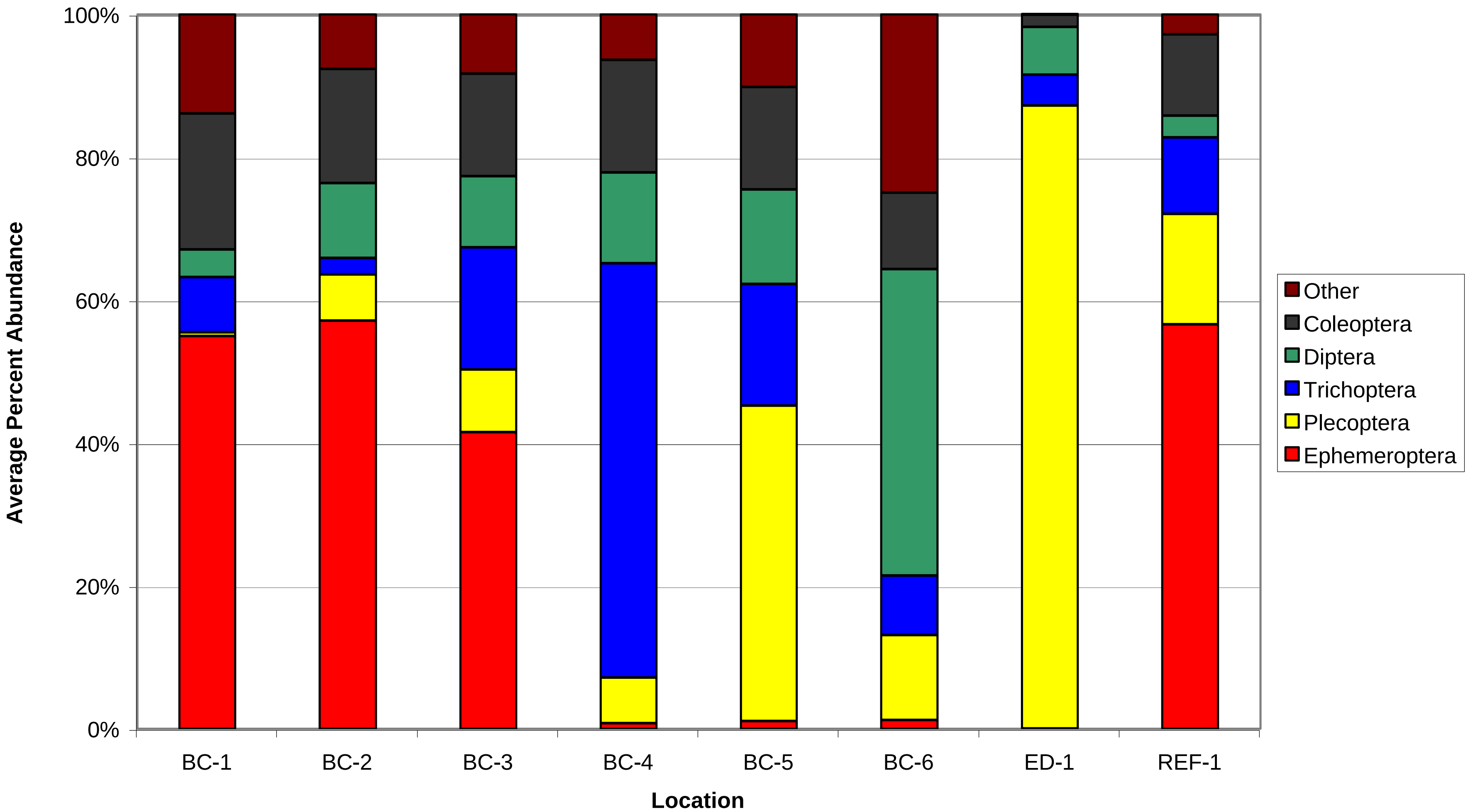
Table 5. Sample Metrics (No Simuliidae)

	Station							
Metric	BC-1	BC-2	BC-3	BC-4	BC-5	BC-6	ED-1	REF-1
Average Number of Organisms per Sample	242.7	213.0	228.0	228.7	197.0	28.0	397.3	152.7
Number of Taxa per Station	37	37	35	29	36	18	16	34
Functional Feeding Groups								
Total Scrapers at Station	530.0	526.0	457.0	490.0	420.0	56.0	57.0	231.0
Total Filterers at Station	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Scrapers:Filterers	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Shredders at Station	5.0	10.0	76.0	65.0	127.0	14.0	45.0	13.0
Shredders:Total	0.05	0.12	0.40	0.24	0.51	0.28	0.83	0.17
EPT Abundance (per Station)	460	421	461	447	368	18	1091	379
Chironomid Abundance (per Station)	23	52	32	70	64	36	36	8
EPT:Chironomid	20.0	8.1	14.4	6.4	5.8	0.5	30.3	47.4
% Contribution Dominant Taxon (average)	34.2	40.8	28.7	49.8	35.5	44.3	54.9	19.5
EPT Index for Station	20	19	19	15	18	10	8	23
H Diversity (average)	3.2	3.1	3.4	2.4	3.1	2.2	1.9	3.6
H Max (average)	4.3	4.4	4.4	3.9	4.2	2.7	3.4	4.4
Hillsenhoff's Biotic Index (average)	3.5	3.6	3.6	3.8	3.4	5.1	2.2	1.8
Community Loss Index (Relative to REF-1)	0.32	0.3	0.4	0.55	0.44	1.33	1.5	n/a
Community Loss Index (Relative to BC-1)	n/a	0.24	0.31	0.55	0.39	1.39	1.69	n/a
Biological Condition Score (relative to REF-1)	62.5	50	62.5	37.5	41.7	16.7	37.5	n/a
Biological Condition Score (relative to BC-1)	n/a	72.7	86.4	54.5	72.7	40.9	50	n/a
Biological Condition Category (relative to REF-1)	Slight	Moderate	Slight	Moderate	Moderate	Severe	Moderate	n/a
Biological Condition Category (relative to BC-1)	n/a	Slight	Not	Slight	Slight	Moderate	Moderate	n/a

Figure O 6. Relative Abundance Observed by Taxon (no Simuliidae)
Midnite Mine Site
Wellpinit, WA



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Location: Midnite Mine, WA

Table 6. Community Bioassessment

				Functional Group	Regional	Sample ID											
Taxon					**Tolerance**	266-0063	266-0103	266-0104	266-0105	266-0062	266-0100	266-0101	266-0102	266-0060	266-0111	266-0112	266-0113
Class	Order	Family	Genus			BC-1A	BC-1B	BC-1C	BC-1D	BC-2A	BC-2B	BC-2C	BC-2D	BC-3A	BC-3B	BC-3C	BC-3D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5				1				2				
			Acerpenna	Collector/gatherer	4	5	8	18	1	13	8	3	2	6	2	4	1
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1	4	21	25	23	11	1	5	16	25	23	7	16
			Drunella	Scraper	0	3	11	57	7	4	5	2	3	2	1	1	3
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1				5		1	8	1				2
		Heptageniidae	*Epeorus*	Scraper	0	2	10	3		11	20	6		2	5	9	
			Cinygmula	Scraper	4	44	56	132	4	96	125	46	13	49	78	70	27
			Cinygma	Scraper	4												
		Ameletidae	*Ameletus*	Scraper	0	1			1								
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2				1			1		2			39
			Zapada	Shredder	2				1								3
			Ostrocerca	Shredder	2					4			5	33	9	1	26
		Taeniopterygidae	*Taenionema*	Scraper	2			2	2	4	10	20	17	1	11	2	25
		Chloroperlidae	*Sweltsa*	Predator	1												
		Perlodidae	*Isoperla*	Predator	2		1	1									
		Capniidae	*Eucapnopsis*	Shredder	1												
		Leuctridae	*Paraleuctra*	Shredder	0						1						
			Perlomyia	Shredder	0						1					1	
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4							1			12	15	6
			Parapsyche	Filterer	1			2	1		1						
		Rhyacophilidae	*Rhyacophila*	Predator	0	1	1	6			6		1	1			1
		Lepidostomatidae	*Lepidostoma*	Shredder	1	11		4	1		1	1	3	20	1	2	1
		Brachycentridae	*Micrasema*	Shredder	1												1
		Philopotamidae		Filterer	3												
		Glossosomatidae	*Glossosoma*	Scraper	0			1									
		Uenoidae	*Neophylax*	Scraper	3	4	15	7		1	3	1		1	6	57	4
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4			1	1								
		Limnephilidae	*Chyranda*	Shredder	1	1	1						1	1			3
			immature	Shredder	4			1	1								
			Eocosmosus	Shredder	2								1				
			Clostoeca	Shredder	1												1
			Hesperophylax	Shredder	5												
			Cryptochia	Shredder	0												
		Apataniidae	*Manophylax*	Shredder	4									1			
	Diptera	Chironomidae		Scraper	6	3	3	17	2	7	31	14	4	18	9	5	8
		Tipulidae	*Tipula*	Shredder	4				1								
			Ormosia	Collector-gatherer	3			1							24		
			Dicranota	Predator	3							2					
			Limonia	Shredder	6									2	2		
			Pedicia	Predator	6												
		Psychodidae	*Pericoma*	Collector-gatherer	4	1	1	2	2	4	1		5	8			2
		Simuliidae	*Simulium*	Collector-filterer	6				1			4	4	13	6	2	3
			Prosimulium	Collector-filterer	3		1	5		388	1040	38	7	20	140	6	15
		Tabanidae	*Tabanus*	Predator	5												
		Blephariceridae	*Philorus*	Scraper	0					2	6						
		Dixidae	*Dixa*	Collector-gatherer	1												
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5	1				1							
		Hydrophilidae	*Crenetis*	Predator	5												
			Enochrus	Shredder	5												1
		Elmidae	*Narpus*	Scraper	4		1	13		1	4			1	18	1	
			Optioservus	Scraper	4		1	2		11	10	7	1	2	9	8	
			Zaitzevia	Scraper	4						3						
			Heterlimnius	Scraper	4	7	16	96	2	15	17	25	3	12	30	15	6
			Lara	Shredder	4		2				1	7		1	1		1
		Gyrinidae	*Gyrinus*	Predator	5												
		Amphizoidae	*Amphizoa*	Predator	1												
Oligochaeta				Deposit Feeder	5	8	15	31	4	6	2	20	2	6	5	1	4
Nematoda				Parasite	5						1						
Mollusca	Gastropoda	Physidae		Scraper	8	4		2	15	1	7	8	2	9	9	12	6
		Lymnaeidae		Scraper	6												
		Planorbidae		Scraper	7				2			1					
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8	4	14	5			1		1	3	2	5	2
Hirudinea				Predator	10			1						1			
Turbellaria	Tricladida	Planariidae		Scraper	1	1	4	12	21			2	2	1	3		3

Symbiosis Environmental
Bioassessment Report

Client: Lockheed-Martin
Date: May, 2003

Location: Midnite Mine, WA

Table 6. Community Bioassessment

Taxon				Functional Group	Regional Tolerance	Sample ID											
						A00521	A00522	A00523	A00524	266-0058	266-0120	266-0121	266-0122	266-0039	266-0126	266-0127	266-0128
Class	Order	Family	Genus			BC-4A	BC-4B	BC-4C	BC-4D	BC-5A	BC-5B	BC-5C	BC-5D	BC-6A	BC-6B	BC-6C	BC-6D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5												
			Acerpenna	Collector/gatherer	4	1								1			1
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1												
			Drunella	Scraper	0												
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1												
		Heptageniidae	*Epeorus*	Scraper	0			1		2		2					
			Cinygmula	Scraper	4		3			2							
			Cinygma	Scraper	4												
		Ameletidae	*Ameletus*	Scraper	0								2				
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2				21	3	11		11				
			Zapada	Shredder	2	7	1		7	1	5		4				
			Ostrocerca	Shredder	2	4	2	1	26	14	10	1	99	2			10
		Taeniopterygidae	*Taenionema*	Scraper	2	10	12	6	70	85	110	17	70	7			2
		Chloroperlidae	*Sweltsa*	Predator	1												
		Perlodidae	*Isoperla*	Predator	2												
		Capniidae	*Eucapnopsis*	Shredder	1				1		3		6	1			
		Leuctridae	*Paraleuctra*	Shredder	0												
			Perylomia	Shredder	0	1				1							1
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4	99	41	2	3	12	29	15		1		1	2
			Parapsyche	Filterer	1							1					
		Rhyacophilidae	*Rhyacophila*	Predator	0	10	2			8	1	1	2	1			
		Lepidostomatidae	*Lepidostoma*	Shredder	1				8		1		1				
		Philopotamidae		Filterer	3												
		Glossosomatidae	*Glossosoma*	Scraper	0												
		Uenoidae	*Neophylax*	Scraper	3	8	89	147	3	13	5	12	1				
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4												1
		Limnephilidae	*Chyranda*	Shredder	1						1	1	4				
			immature	Shredder	4				1				1				
			Eocosmosus	Shredder	2				1				1				1
			Costoeca	Shredder	1												
			Hesperophylax	Shredder	5					1				1		3	2
			Cryptochia	Shredder	0												
		Apataniidae	*Manophylax*	Shredder	4												
	Diptera	Chironomidae		Scraper	6	27	24	19	92	30	29	5	30	30	5	1	20
		Tipulidae	*Tipula*	Shredder	4												
			Ormosia	Collector-gatherer	3	5	7	2	1	6		2					
			Dicranota	Predator	3			1	1		1		1				
			Limonia	Shredder	6	2											
			Pedicia	Predator	6							1					
		Psychodidae	*Pericoma*	Collector-gatherer	4				1								
		Simuliidae	*Simulium*	Collector-filterer	6						3						
			Prosimulium	Collector-filterer	3	224	44	4	76	2344	319	124	24	226	55	29	426
		Tabanidae	*Tabanus*	Predator	5						1						
		Blephariceridae	*Philorus*	Scraper	0					3							
		Dixidae	*Dixa*	Collector-gatherer	1												
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5							1					
		Hydrophilidae	*Crenetis*	Predator	5												
		Elmidae	*Narpus*	Scraper	4	1				3		1			1	1	
			Optioservus	Scraper	4	42	47	12	3	12	21	28	3	3	2	1	1
			Zaitzevia	Scraper	4	1	2				1						
			Heterlimnius	Scraper	4	1	1	1	2	6	8	4	1	1			
			Lara	Shredder	4												
		Gyrinidae	*Gyrinus*	Predator	5								1				
		Amphizoidae	*Amphizoa*	Predator	1												
Oligochaeta				Deposit Feeder	5	4		4	2	25	7	6		15	2		3
Nematoda				Parasite	5					1							
Mollusca	Gastropoda	Physidae		Scraper	8	13	8	10	29	2	9	7	9	3		1	5
		Lymnaeidae		Scraper	6												
		Planorbidae		Scraper	7		1										
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8												1
Hirudinea				Predator	10												
Turbellaria	Tricladida	Planariidae		Scraper	1	2		2		2	1		1				

Symbiosis Environmental
Bioassessment Report

Client: Lockheed-Martin
Date: May, 2003

Location: Midnite Mine, WA

Table 6. Community Bioassessment

Taxon				Functional Group	Regional Tolerance	Sample ID							
						266-0061	266-0114	266-0115	266-0116	266-0064	266-0107	266-0108	266-0109
Class	Order	Family	Genus			ED-1A	ED-1B	ED-1C	ED-1D	REF-1A	REF-1B	REF-1C	REF-1D
Insecta	Ephemeroptera	Baetidae	*Baetis*	Collector/gatherer	5								
			Acerpenna	Collector/gatherer	4					1	4	2	4
		Ephemerellidae	*Ephemerella*	Collector/gatherer	1					15	28	5	6
			Drunella	Scraper	0					17	39	13	10
		Leptophlebiidae	*Paraleptophlebia*	Collector/gatherer	1								
		Heptageniidae	*Epeorus*	Scraper	0					31	12	19	13
			Cinygmula	Scraper	4					9	35	7	5
			Cinygma	Scraper	4					11		11	8
		Ameletidae	*Ameletus*	Scraper	0								
	Plecoptera	Nemouridae	*Amphinemura*	Shredder	2	129	103	76	14				
			Zapada	Shredder	2	26	20	7	2	18	2	14	2
			Ostrocerca	Shredder	2	363	202	113	25	3			
		Taeniopterygidae	*Taenionema*	Scraper	2	1			1	3	1	3	
		Chloroperlidae	*Sweltsa*	Predator	1					4		4	1
		Perlodidae	*Isoperla*	Predator	2					2	1	1	2
		Capniidae	*Eucapnopsis*	Shredder	1								
		Leuctridae	*Paraleuctra*	Shredder	0					11		3	1
			Perylomia	Shredder	0					1			2
	Trichoptera	Hydropsychidae	*Hydropsyche*	Filterer	4		1	7					
			Parapsyche	Filterer	1	14	5	23	2		1	2	
		Rhyacophilidae	*Rhyacophila*	Predator	0					14	8	7	6
		Lepidostomatidae	*Lepidostoma*	Shredder	1		1			2			
		Philopotamidae		Filterer	3							1	
		Glossosomatidae	*Glossosoma*	Scraper	0						4		5
		Uenoidae	*Neophylax*	Scraper	3								
		Hydroptilidae	*Ochrotrichia*	Collector-gatherer	4								
		Limnephilidae	*Chyranda*	Shredder	1					3		2	
			immature	Shredder	4						1	1	
			Eocosmosus	Shredder	2				3				1
			Clostoeca	Shredder	1							1	
			Hesperophylax	Shredder	5								
			Cryptochia	Shredder	0							2	
		Apataniidae	*Manophylax*	Shredder	4								
	Diptera	Chironomidae		Scraper	6	11	17	8	2	6	1	1	2
		Tipulidae	*Tipula*	Shredder	4					1			
			Ormosia	Collector-gatherer	3	16	1		1				
			Dicranota	Predator	3	5	5		1	1		3	1
			Limonia	Shredder	6	13	2	1	1				
			Pedicia	Predator	6								
		Psychodidae	*Pericoma*	Collector-gatherer	4					1			
		Simuliidae	*Simulium*	Collector-filterer	6								
			Prosimulium	Collector-filterer	3					10	2	6	5
		Tabanidae	*Tabanus*	Predator	5								
		Blephariceridae	*Philorus*	Scraper	0								
		Dixidae	*Dixa*	Collector-gatherer	1	1			1				
	Coleoptera	Helophoridae	*Helophorus*	Shredder	5								
		Hydrophilidae	*Crenetis*	Predator	5					1			
		Elmidae	*Narpus*	Scraper	4								
			Optioservus	Scraper	4		2						
			Zaitzevia	Scraper	4								
			Heterlimnius	Scraper	4	11	6	1	1	2	2	2	1
			Lara	Shredder	4					25		19	7
		Gyrinidae	*Gyrinus*	Predator	5								
		Amphizoidae	*Amphizoa*	Predator	1					1			
Oligochaeta				Deposit Feeder	5	1				4	6	1	1
Mollusca	Gastropoda	Physidae		Scraper	8								
		Lymnaeidae		Scraper	6								
		Planorbidae		Scraper	7								
	Bivalvia	Sphaeriidae	*Pisidium*	Filterer	8								
Hirudinea				Predator	10								
Turbellaria	Tricladida	Planariidae		Scraper	1						2		

Table 6. Community Bioassessment

Symbiosis Environmental
Bioassessment Report

Client: Lockheed-Martin
Date: May, 2003

Location: Midnite Mine, WA

	Sample ID											
	266-0063	266-0103	266-0104	266-0105	266-0062	266-0100	266-0101	266-0102	266-0060	266-0111	266-0112	266-0113
Metric	BC-1A	BC-1B	BC-1C	BC-1D	BC-2A	BC-2B	BC-2C	BC-2D	BC-3A	BC-3B	BC-3C	BC-3D
Total Number of Organisms	105	182	447	100	580	1307	222	96	241	406	224	210
Number of Taxa	18	19	26	23	18	26	22	22	27	23	20	27
Functional Feeding Groups												
Scrapers	69	117	344	56	153	241	132	45	98	179	180	82
Filterers	4	15	12	2	388	1042	43	12	36	160	28	26
Scrapers:Filterers	17.25	7.80	28.67	28.00	0.39	0.23	3.07	3.75	2.72	1.12	6.43	3.15
Shredders	13	3	5	5	5	4	9	10	60	13	4	76
Shredders:Total	0.12	0.02	0.01	0.05	0.01	0.00	0.04	0.10	0.25	0.03	0.02	0.36
EPT Abundance	76	124	260	50	144	183	94	65	144	148	169	159
Chironomid Abundance	3	3	17	2	7	31	14	4	18	9	5	8
EPT:Chironomid	25.33	41.33	15.29	25.00	20.57	5.90	6.71	16.25	8.00	16.44	33.80	19.88
% Contribution Dominant Taxon	41.90	30.77	29.53	23.00	66.90	79.57	20.72	17.71	20.33	34.48	31.25	18.57
EPT Index	10	9	14	14	8	13	11	12	13	10	11	16
H' Diversity	3.12	3.32	3.25	3.52	1.84	1.34	3.61	3.83	3.78	3.28	3.13	3.85
H Max	4.17	4.25	4.70	4.52	4.17	4.70	4.46	4.46	4.75	4.52	4.32	4.75
Hillsenhoff's Biotic Index	3.7	3.4	3.3	2.8	3.2	3.1	3.7	2.9	3.5	3.4	3.7	2.8

	Sample ID											
	A00521	A00522	A00523	A00524	266-0058	266-0120	266-0121	266-0122	266-0039	266-0126	266-0127	266-0128
Metric	BC-4A	BC-4B	BC-4C	BC-4D	BC-5A	BC-5B	BC-5C	BC-5D	BC-6A	BC-6B	BC-6C	BC-6D
Total Number of Organisms	462	284	212	348	2576	576	229	272	292	65	37	476
Number of Taxa	19	15	14	19	22	21	18	20	13	5	7	14
Functional Feeding Groups												
Scrapers	105	187	198	199	160	184	76	117	44	8	4	28
Filterers	323	85	6	79	2356	351	140	24	227	55	30	429
Scrapers:Filterers	0.33	2.20	33.00	2.52	0.07	0.52	0.54	4.88	0.19	0.15	0.13	0.07
Shredders	14	3	1	65	20	31	3	127	4	0	3	14
Shredders:Total	0.03	0.01	0.00	0.19	0.01	0.05	0.01	0.47	0.01	0.00	0.08	0.03
EPT Abundance	140	150	157	141	142	176	50	202	14	0	4	20
Chironomid Abundance	27	24	19	92	30	29	5	30	30	5	1	20
EPT:Chironomid	5.19	6.25	8.26	1.53	4.73	6.07	10.00	6.73	0.47	0.00	4.00	1.00
% Contribution Dominant Family	48.48	31.34	69.34	26.44	90.99	55.38	54.15	36.40	77.40	84.62	78.38	89.50
EPT Index	8	7	5	10	11	10	8	12	7	0	2	8
H' Diversity	2.47	2.85	1.82	2.92	0.73	2.31	2.48	2.76	1.33	0.89	1.27	0.78
H Max	4.25	3.91	3.81	4.25	4.46	4.39	4.17	4.32	3.70	2.32	2.81	3.81
Hillsenhoff's Biotic Index	3.5	3.7	3.5	3.8	3.0	3.1	3.4	2.7	3.4	3.3	3.5	3.2

	Sample ID							
	266-0061	266-0114	266-0115	266-0116	266-0064	266-0107	266-0108	266-0109
Metric	ED-1A	ED-1B	ED-1C	ED-1D	REF-1A	REF-1B	REF-1C	REF-1D
Total Number of Organisms	591	365	236	54	197	149	130	83
Number of Taxa	12	12	8	12	26	17	24	20
Functional Feeding Groups								
Scrapers	23	25	9	4	79	96	56	44
Filterers	14	6	30	2	10	3	9	5
Scrapers:Filterers	1.64	4.17	0.30	2.00	7.90	32.00	6.22	8.80
Shredders	531	328	197	45	64	3	42	13
Shredders:Total	0.90	0.90	0.83	0.83	0.32	0.02	0.32	0.16
EPT Abundance	533	332	226	47	145	136	98	66
Chironomid Abundance	11	17	8	2	6	1	1	2
EPT:Chironomid	48.45	19.53	28.25	23.50	24.17	136.00	98.00	33.00
% Contribution Dominant Family	61.42	55.34	47.88	46.30	15.74	26.17	14.62	15.66
EPT Index	5	6	5	6	16	12	18	14
H' Diversity	1.82	1.84	1.90	2.42	3.99	3.01	3.95	3.88
H Max	3.58	3.58	3.00	3.58	4.70	4.09	4.58	4.32
Hillsenhoff's Biotic Index	2.2	2.3	2.1	2.2	1.9	1.7	2.0	1.8

Symbiosis Environmental | Client: Lockheed-Martin | Location: Midnite Mine, WA

Table 6. Community Bioassessment | Bioassessment Report | Date: May, 2003

	Station							
Metric	BC-1	BC-2	BC-3	BC-4	BC-5	BC-6	ED-1	REF-1
Average Number of Organisms per Sample	244.7	703.0	290.3	319.3	1127.0	131.3	397.3	158.7
Number of Taxa per Station	37	37	35	29	36	18	16	34
Functional Feeding Groups								
Total Scrapers at Station	530.0	526.0	457.0	490.0	420.0	56.0	57.0	231.0
Total Filterers at Station	31.0	1473.0	224.0	414.0	2847.0	312.0	50.0	22.0
Scrapers:Filterers	17.1	0.4	2.0	1.2	0.1	0.2	1.1	10.5
Total Shredders at Station	5.0	10.0	76.0	65.0	127.0	14.0	45.0	13.0
Shredders:Total	0.05	0.10	0.36	0.19	0.47	0.03	0.83	0.16
EPT Abundance (per Station)	460	421	461	447	368	18	1091	379
Chironomid Abundance (per Station)	23	52	32	70	64	36	36	8
EPT:Chironomid	20.0	8.1	14.4	6.4	5.8	0.5	30.3	47.4
% Contribution Dominant Taxon (average)	34.1	55.7	28.7	49.7	66.8	80.1	54.9	18.8
EPT Index for Station	20	19	19	15	18	10	8	23
H Diversity (average)	3.2	2.3	3.4	2.4	1.8	1.2	1.9	3.7
H Max (average)	4.4	4.4	4.5	4.0	4.3	2.9	3.4	4.5
Hillsenhoff's Biotic Index (average)	3.5	3.3	3.5	3.6	3.2	3.4	2.2	1.8
Community Loss Index (Relative to REF-1)	0.32	0.3	0.4	0.55	0.44	1.33	1.5	n/a
Community Loss Index (Relative to BC-1)	n/a	0.24	0.31	0.55	0.39	1.39	1.69	n/a
Biological Condition Score (relative to REF-1)	62.5	50	62.5	37.5	41.7	16.7	37.5	n/a
Biological Condition Score (relative to BC-1)	n/a	72.7	86.4	54.5	72.7	40.9	50	n/a
Biological Condition Category (relative to REF-1)	Slight	Moderate	Slight	Moderate	Moderate	Severe	Moderate	n/a
Biological Condition Category (relative to BC-1)	n/a	Slight	Not	Slight	Slight	Moderate	Moderate	n/a

Note: Organism Density, Scrapers:Filterers, EPT Abundance, Chironomid Abundance, EPT/Chironomid, % Dominant Taxon, HBI and Diversity are based on data from quantitative replicates A-C.
Taxa Richness, EPT Index and Community Loss index are based on all replicates A-D. Shredders:Total is based on qualitative Replicate D only

Figure O 7. Diversity by Station
Midnite Mine Site
Wellpinit, WA

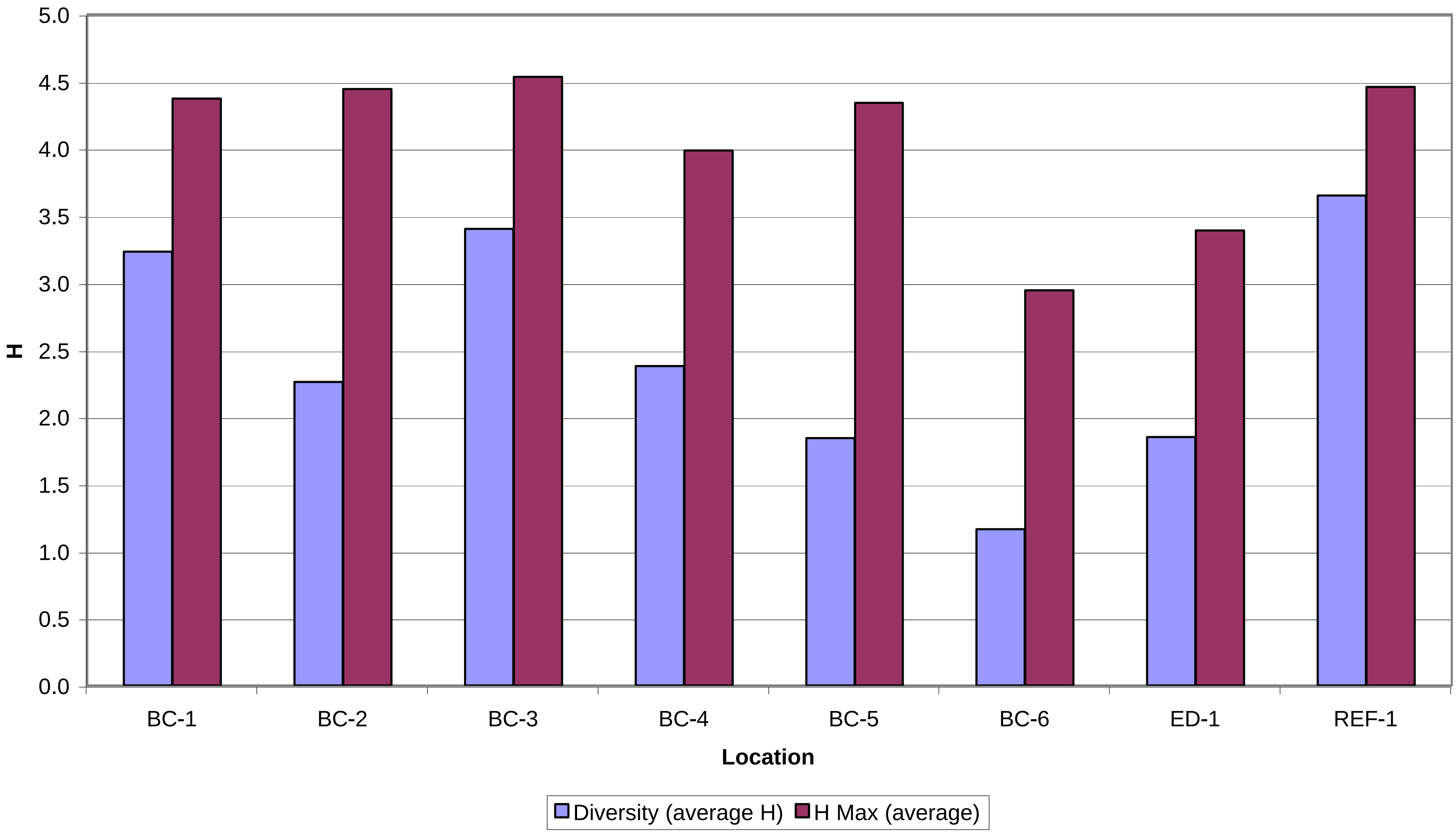

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Figure O 8. Diversity by Station (No Simuliidae)
Midnite Mine Site
Wellpinit, WA

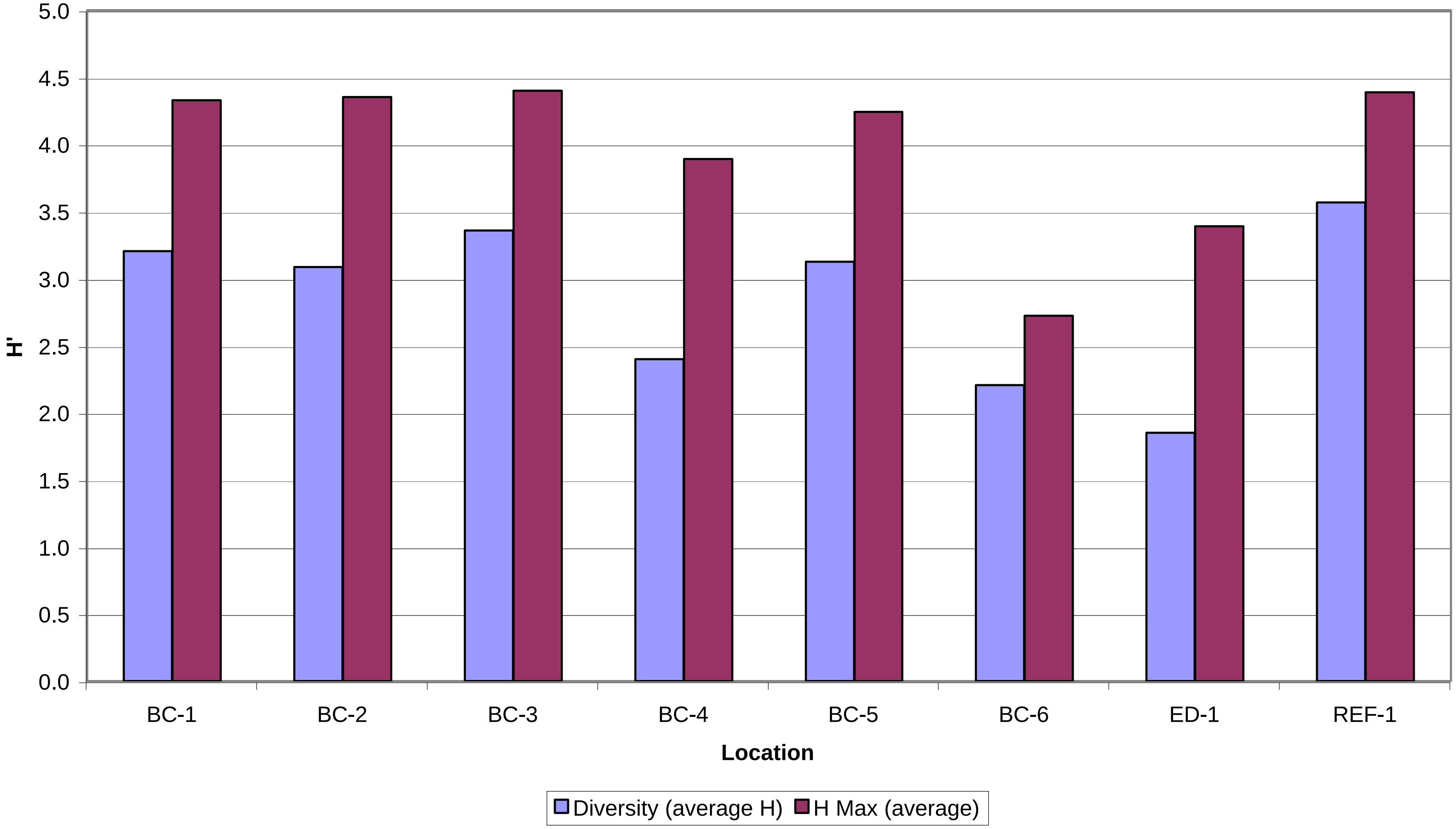

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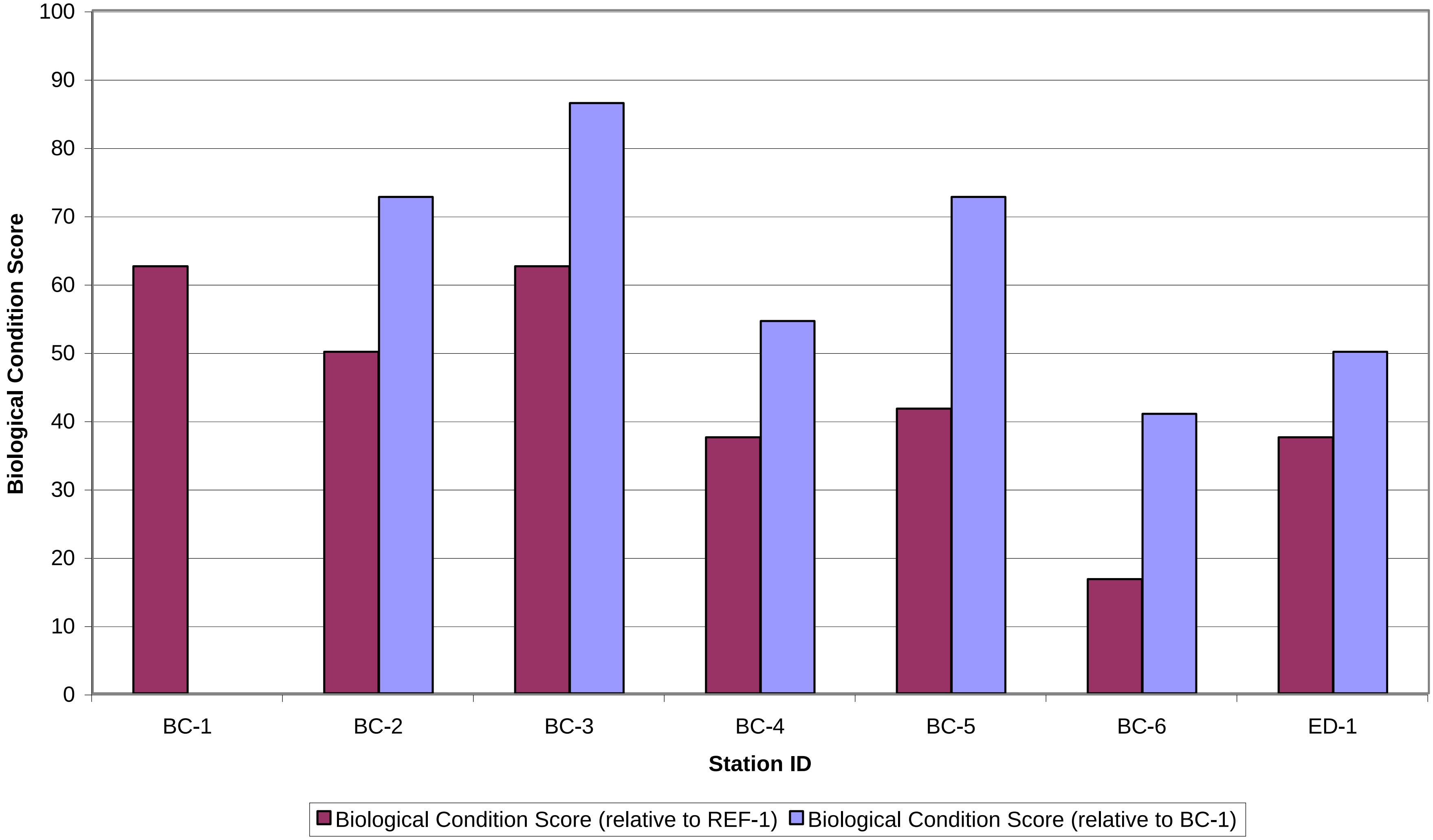
Figure O 9. Biological Condition Scores
Midnite Mine Site
Wellpinit, WA



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Appendix P - Food Chain Models
Midnite Mine Site
Wellpinit, Washington

TABLE PH 4. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.6	0.000687	0.0010992	0.0025	0.0665	0.00016625	1	0.5	0.0025309	0.62	0.004	0.062	0.041
Arsenic	75	0.000687	0.051525	0.0071	0.0665	0.00047215	1	0.5	0.1039943	9.63	0.011	1.91	0.054
Barium	131	0.000687	0.089997	0.022	0.0665	0.001463	1	0.5	0.18292	51	0.004	5.1	0.036
Beryllium	1.1	0.000687	0.0007557	0.0278	0.0665	0.0018487	1	0.5	0.0052088	6.2	0.001	0.62	0.008
Cadmium	0.14	0.000687	0.00009618	0.009	0.0665	0.0005985	1	0.5	0.00138936	2.3	0.001	0.23	0.006
Cobalt	11.3	0.000687	0.0077631	0.792	0.0665	0.052668	1	0.5	0.1208622	20	0.006	5	0.024
Copper	87.8	0.000687	0.0603186	1.19	0.0665	0.079135	1	0.5	0.2789072	35.4	0.008	24.3	0.011
Manganese	352	0.000687	0.241824	36.8	0.0665	2.4472	1	0.5	5.378048	268	0.020	83	0.065
Nickel	29	0.000687	0.019923	1.26	0.0665	0.08379	1	0.5	0.207426	42.1	0.005	23.1	0.009
Selenium	0.55	0.000687	0.00037785	0.0272	0.0665	0.0018088	1	0.5	0.0043733	0.25	0.017	0.025	0.175
Silver	0.275	0.000687	0.000188925	0.001	0.0665	0.0000665	1	0.5	0.00051085	2.7	0.000	0.27	0.002
Uranium	104	0.000687	0.071448	8.17	0.0665	0.543305	1	0.5	1.229506	5	0.246	0.5	**2.459**
Vanadium	66.3	0.000687	0.0455481	0.0005	0.0665	0.00003325	1	0.5	0.0911627	2.1	0.043	0.21	0.434
Zinc	74.5	0.000687	0.0511815	1.33	0.0665	0.088445	1	0.5	0.279253	225	0.001	22.5	0.012

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 4. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.6	0.000576	0.0009216	0.0025	0.097	0.0002425	1	2.09	0.000556986	NS	N/A	NS	N/A
Arsenic	75	0.000576	0.0432	0.0071	0.097	0.0006887	1	2.09	0.020999378	22.8	0.0009	5.7	0.004
Barium	131	0.000576	0.075456	0.022	0.097	0.002134	1	2.09	0.037124402	416.5	0.0001	208.3	0.000
Beryllium	1.1	0.000576	0.0006336	0.0278	0.097	0.0026966	1	2.09	0.001593397	NS	N/A	NS	N/A
Cadmium	0.14	0.000576	0.00008064	0.009	0.097	0.000873	1	2.09	0.000456287	3.4	0.0001	0.85	0.001
Cobalt	11.3	0.000576	0.0065088	0.792	0.097	0.076824	1	2.09	0.039872153	43.9	0.0009	23.1	0.002
Copper	87.8	0.000576	0.0505728	1.19	0.097	0.11543	1	2.09	0.079427177	33.2	0.0024	26.9	0.003
Manganese	352	0.000576	0.202752	36.8	0.097	3.5696	1	2.09	1.80495311	9,770	0.0002	977	0.002
Nickel	29	0.000576	0.016704	1.26	0.097	0.12222	1	2.09	0.066470813	79	0.0008	57.2	0.001
Selenium	0.55	0.000576	0.0003168	0.0272	0.097	0.0026384	1	2.09	0.001413971	0.8	0.0018	0.4	0.004
Silver	0.275	0.000576	0.0001584	0.001	0.097	0.000097	1	2.09	0.000122201	39.7	0.0000	3.97	0.000
Uranium	104	0.000576	0.059904	8.17	0.097	0.79249	1	2.09	0.407844019	1,600	0.0003	160	0.003
Vanadium	66.3	0.000576	0.0381888	0.0005	0.097	0.0000485	1	2.09	0.018295359	114	0.0002	11.4	0.002
Zinc	74.5	0.000576	0.042912	1.33	0.097	0.12901	1	2.09	0.08225933	224	0.0004	10.5	0.008

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 4. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14		1	3.63					
Antimony	1.6	0.000895	0.001432	0.0025	0.14	0.00035	1	3.63	0.000490909	NS	N/A	NS	N/A
Arsenic	75	0.000895	0.067125	0.0071	0.14	0.000994	1	3.63	0.018765565	22.8	0.001	5.7	0.003
Barium	131	0.000895	0.117245	0.022	0.14	0.00308	1	3.63	0.033147383	416.5	0.000	208.3	0.000
Beryllium	1.1	0.000895	0.0009845	0.0278	0.14	0.003892	1	3.63	0.001343388	NS	N/A	NS	N/A
Cadmium	0.14	0.000895	0.0001253	0.009	0.14	0.00126	1	3.63	0.000381625	3.4	0.000	0.85	0.000
Cobalt	11.3	0.000895	0.0101135	0.792	0.14	0.11088	1	3.63	0.033331543	43.9	0.001	23.1	0.001
Copper	87.8	0.000895	0.078581	1.19	0.14	0.1666	1	3.63	0.067542975	33.2	0.002	26.9	0.003
Manganese	352	0.000895	0.31504	36.8	0.14	5.152	1	3.63	1.506071625	9,770	0.000	977	0.002
Nickel	29	0.000895	0.025955	1.26	0.14	0.1764	1	3.63	0.055745179	79	0.001	57.2	0.001
Selenium	0.55	0.000895	0.00049225	0.0272	0.14	0.003808	1	3.63	0.001184642	0.8	0.001	0.4	0.003
Silver	0.275	0.000895	0.000246125	0.001	0.14	0.00014	1	3.63	0.000106371	39.7	0.000	3.97	0.000
Uranium	104	0.000895	0.09308	8.17	0.14	1.1438	1	3.63	0.340738292	1,600	0.000	160	0.002
Vanadium	66.3	0.000895	0.0593385	0.0005	0.14	0.00007	1	3.63	0.016365978	114	0.000	11.4	0.001
Zinc	74.5	0.000895	0.0666775	1.33	0.14	0.1862	1	3.63	0.069663223	224	0.000	10.5	0.007

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 4. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.6	0.0442	0.07072	0.0025	0.04	0.0001	1	0.55	0.128763636	NS	N/A	NS	N/A
Arsenic	75	0.0442	3.315	0.0071	0.04	0.000284	1	0.55	6.027789091	22.8	0.26	5.7	**1.06**
Barium	131	0.0442	5.7902	0.022	0.04	0.00088	1	0.55	10.52923636	416.5	0.03	208.3	0.05
Beryllium	1.1	0.0442	0.04862	0.0278	0.04	0.001112	1	0.55	0.090421818	NS	N/A	NS	N/A
Cadmium	0.14	0.0442	0.006188	0.009	0.04	0.00036	1	0.55	0.011905455	3.4	0.00	0.85	0.01
Cobalt	11.3	0.0442	0.49946	0.792	0.04	0.03168	1	0.55	0.965709091	43.9	0.02	23.1	0.04
Copper	87.8	0.0442	3.88076	1.19	0.04	0.0476	1	0.55	7.142472727	33.2	0.22	26.9	0.27
Manganese	352	0.0442	15.5584	36.8	0.04	1.472	1	0.55	30.96436364	9770	0.00	977	0.03
Nickel	29	0.0442	1.2818	1.26	0.04	0.0504	1	0.55	2.422181818	79	0.03	57.2	0.04
Selenium	0.55	0.0442	0.02431	0.0272	0.04	0.001088	1	0.55	0.046178182	0.8	0.06	0.4	0.12
Silver	0.275	0.0442	0.012155	0.001	0.04	0.00004	1	0.55	0.022172727	39.7	0.00	3.97	0.01
Uranium	104	0.0442	4.5968	8.17	0.04	0.3268	1	0.55	8.952	1,600	0.01	160	0.06
Vanadium	66.3	0.0442	2.93046	0.0005	0.04	0.00002	1	0.55	5.328145455	114	0.05	11.4	0.47
Zinc	74.5	0.0442	3.2929	1.33	0.04	0.0532	1	0.55	6.083818182	224	0.03	10.5	0.58

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 4. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.6	0.00827	0.013232	0.0025	0.0099	0.00002475	1	0.07	0.189382143	NS	N/A	NS	N/A
Arsenic	75	0.00827	0.62025	0.0071	0.0099	0.00007029	1	0.07	8.861718429	22.8	0.39	5.7	**1.55**
Barium	131	0.00827	1.08337	0.022	0.0099	0.0002178	1	0.07	15.47982571	416.5	0.04	208.3	0.07
Beryllium	1.1	0.00827	0.009097	0.0278	0.0099	0.00027522	1	0.07	0.133888857	NS	N/A	NS	N/A
Cadmium	0.14	0.00827	0.0011578	0.009	0.0099	0.0000891	1	0.07	0.017812857	3.4	0.01	0.85	0.02
Cobalt	11.3	0.00827	0.093451	0.792	0.0099	0.0078408	1	0.07	1.447025714	43.9	0.03	23.1	0.06
Copper	87.8	0.00827	0.726106	1.19	0.0099	0.011781	1	0.07	10.54124286	33.2	0.32	26.9	0.39
Manganese	352	0.00827	2.91104	36.8	0.0099	0.36432	1	0.07	46.79085714	9770	0.00	977	0.05
Nickel	29	0.00827	0.23983	1.26	0.0099	0.012474	1	0.07	3.604342857	79	0.05	57.2	0.06
Selenium	0.55	0.00827	0.0045485	0.0272	0.0099	0.00026928	1	0.07	0.068825429	0.8	0.09	0.4	0.17
Silver	0.275	0.00827	0.00227425	0.001	0.0099	0.0000099	1	0.07	0.032630714	39.7	0.00	3.97	0.01
Uranium	104	0.00827	0.86008	8.17	0.0099	0.080883	1	0.07	13.44232857	1,600	0.01	160	0.08
Vanadium	66.3	0.00827	0.548301	0.0005	0.0099	0.00000495	1	0.07	7.832942143	114	0.07	11.4	0.69
Zinc	74.5	0.00827	0.616115	1.33	0.0099	0.013167	1	0.07	8.989742857	224	0.04	10.5	0.86

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
N/A:	Value could not be calculated with the information available

TABLE PG 4. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0143			0.201		1	2.2					
Antimony	1.6	0.0143	0.02288	0.0025	0.201	0.0005025	1	2.2	0.010628409	0.62	0.02	0.062	0.17
Arsenic	75	0.0143	1.0725	0.0071	0.201	0.0014271	1	2.2	0.488148682	9.63	0.05	1.91	0.26
Barium	131	0.0143	1.8733	0.022	0.201	0.004422	1	2.2	0.85351	51	0.02	5.1	0.17
Beryllium	1.1	0.0143	0.01573	0.0278	0.201	0.0055878	1	2.2	0.009689909	6.2	0.00	0.62	0.02
Cadmium	0.14	0.0143	0.002002	0.009	0.201	0.001809	1	2.2	0.001732273	2.3	0.00	0.23	0.01
Cobalt	11.3	0.0143	0.16159	0.792	0.201	0.159192	1	2.2	0.14581	20	0.01	5	0.03
Copper	87.8	0.0143	1.25554	1.19	0.201	0.23919	1	2.2	0.679422727	35.4	0.02	24.3	0.03
Manganese	352	0.0143	5.0336	36.8	0.201	7.3968	1	2.2	5.650181818	268	0.02	83	0.07
Nickel	29	0.0143	0.4147	1.26	0.201	0.25326	1	2.2	0.303618182	42.1	0.01	23.1	0.01
Selenium	0.55	0.0143	0.007865	0.0272	0.201	0.0054672	1	2.2	0.006060091	0.25	0.02	0.025	0.24
Silver	0.275	0.0143	0.0039325	0.001	0.201	0.000201	1	2.2	0.001878864	2.7	0.00	0.27	0.01
Uranium	104	0.0143	1.4872	8.17	0.201	1.64217	1	2.2	1.422440909	5	0.28	0.5	**2.84**
Vanadium	66.3	0.0143	0.94809	0.0005	0.201	0.0001005	1	2.2	0.430995682	2.1	0.21	0.21	**2.05**
Zinc	74.5	0.0143	1.06535	1.33	0.201	0.26733	1	2.2	0.605763636	225	0.00	22.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 7. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.000687	0.00037785	0.00025	0.0665	0.000016625	1	0.5	0.00078895	0.62	0.001	0.062	0.013
Arsenic	11.4	0.000687	0.0078318	0.0007	0.0665	0.00004655	1	0.5	0.0157567	9.63	0.002	1.91	0.008
Barium	119	0.000687	0.081753	0.0165	0.0665	0.00109725	1	0.5	0.1657005	51	0.003	5.1	0.032
Beryllium	4.2	0.000687	0.0028854	0.0032	0.0665	0.0002128	1	0.5	0.0061964	6.2	0.001	0.62	0.010
Cadmium	2.8	0.000687	0.0019236	0.053	0.0665	0.0035245	1	0.5	0.0108962	2.3	0.005	0.23	0.047
Cobalt	99.2	0.000687	0.0681504	0.06	0.0665	0.00399	1	0.5	0.1442808	20	0.007	5	0.029
Copper	29.1	0.000687	0.0199917	0.08	0.0665	0.00532	1	0.5	0.0506234	35.4	0.001	24.3	0.002
Manganese	4710	0.000687	3.23577	91.2	0.0665	6.0648	1	0.5	18.60114	268	0.069	83	0.224
Nickel	230	0.000687	0.15801	1.38	0.0665	0.09177	1	0.5	0.49956	42.1	0.012	23.1	0.022
Selenium	5.2	0.000687	0.0035724	0.0005	0.0665	0.00003325	1	0.5	0.0072113	0.25	0.029	0.025	0.288
Silver	0.215	0.000687	0.000147705	0.01	0.0665	0.000665	1	0.5	0.00162541	2.7	0.001	0.27	0.006
Uranium	3640	0.000687	2.50068	0.727	0.0665	0.0483455	1	0.5	5.098051	5	**1.020**	0.5	**10.196**
Vanadium	28.2	0.000687	0.0193734	0.00051	0.0665	0.000033915	1	0.5	0.03881463	2.1	0.018	0.21	0.185
Zinc	598	0.000687	0.410826	3	0.0665	0.1995	1	0.5	1.220652	225	0.005	22.5	0.054

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight

TABLE PQ 7. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.000576	0.0003168	0.00025	0.097	0.00002425	1	2.09	0.000163182	NS	N/A	NS	N/A
Arsenic	11.4	0.000576	0.0065664	0.0007	0.097	0.0000679	1	2.09	0.003174306	22.8	0.0001	5.7	0.001
Barium	119	0.000576	0.068544	0.0165	0.097	0.0016005	1	2.09	0.033561962	416.5	0.0001	208.3	0.000
Beryllium	4.2	0.000576	0.0024192	0.0032	0.097	0.0003104	1	2.09	0.001306029	NS	N/A	NS	N/A
Cadmium	2.8	0.000576	0.0016128	0.053	0.097	0.005141	1	2.09	0.003231483	3.4	0.0010	0.85	0.004
Cobalt	99.2	0.000576	0.0571392	0.06	0.097	0.00582	1	2.09	0.030124019	43.9	0.0007	23.1	0.001
Copper	29.1	0.000576	0.0167616	0.08	0.097	0.00776	1	2.09	0.011732823	33.2	0.0004	26.9	0.000
Manganese	4710	0.000576	2.71296	91.2	0.097	8.8464	1	2.09	5.530794258	9,770	0.0006	977	0.006
Nickel	230	0.000576	0.13248	1.38	0.097	0.13386	1	2.09	0.127435407	79	0.0016	57.2	0.002
Selenium	5.2	0.000576	0.0029952	0.0005	0.097	0.0000485	1	2.09	0.001456316	0.8	0.0018	0.4	0.004
Silver	0.215	0.000576	0.00012384	0.01	0.097	0.00097	1	2.09	0.000523368	39.7	0.0000	3.97	0.000
Uranium	3640	0.000576	2.09664	0.727	0.097	0.070519	1	2.09	1.036918182	1,600	0.0006	160	0.006
Vanadium	28.2	0.000576	0.0162432	0.00051	0.097	0.00004947	1	2.09	0.007795536	114	0.0001	11.4	0.001
Zinc	598	0.000576	0.344448	3	0.097	0.291	1	2.09	0.304042105	224	0.0014	10.5	0.029

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 7. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.000895	0.00049225	0.00025	0.14	0.000035	1	3.63	0.000145248	NS	N/A	NS	N/A
Arsenic	11.4	0.000895	0.010203	0.0007	0.14	0.000098	1	3.63	0.002837741	22.8	0.000	5.7	0.000
Barium	119	0.000895	0.106505	0.0165	0.14	0.00231	1	3.63	0.029976584	416.5	0.000	208.3	0.000
Beryllium	4.2	0.000895	0.003759	0.0032	0.14	0.000448	1	3.63	0.001158953	NS	N/A	NS	N/A
Cadmium	2.8	0.000895	0.002506	0.053	0.14	0.00742	1	3.63	0.002734435	3.4	0.001	0.85	0.003
Cobalt	99.2	0.000895	0.088784	0.06	0.14	0.0084	1	3.63	0.026772452	43.9	0.001	23.1	0.001
Copper	29.1	0.000895	0.0260445	0.08	0.14	0.0112	1	3.63	0.010260193	33.2	0.000	26.9	0.000
Manganese	4710	0.000895	4.21545	91.2	0.14	12.768	1	3.63	4.678636364	9,770	0.000	977	0.005
Nickel	230	0.000895	0.20585	1.38	0.14	0.1932	1	3.63	0.109931129	79	0.001	57.2	0.002
Selenium	5.2	0.000895	0.004654	0.0005	0.14	0.00007	1	3.63	0.001301377	0.8	0.002	0.4	0.003
Silver	0.215	0.000895	0.000192425	0.01	0.14	0.0014	1	3.63	0.000438685	39.7	0.000	3.97	0.000
Uranium	3640	0.000895	3.2578	0.727	0.14	0.10178	1	3.63	0.925504132	1,600	0.001	160	0.006
Vanadium	28.2	0.000895	0.025239	0.00051	0.14	0.0000714	1	3.63	0.006972562	114	0.000	11.4	0.001
Zinc	598	0.000895	0.53521	3	0.14	0.42	1	3.63	0.263143251	224	0.001	10.5	0.025

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 7. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.0442	0.02431	0.00025	0.04	0.00001	1	0.55	0.044218182	NS	N/A	NS	N/A
Arsenic	11.4	0.0442	0.50388	0.0007	0.04	0.000028	1	0.55	0.916196364	22.8	0.04	5.7	0.16
Barium	119	0.0442	5.2598	0.0165	0.04	0.00066	1	0.55	9.564472727	416.5	0.02	208.3	0.05
Beryllium	4.2	0.0442	0.18564	0.0032	0.04	0.000128	1	0.55	0.33776	NS	N/A	NS	N/A
Cadmium	2.8	0.0442	0.12376	0.053	0.04	0.00212	1	0.55	0.228872727	3.4	0.07	0.85	0.27
Cobalt	99.2	0.0442	4.38464	0.06	0.04	0.0024	1	0.55	7.976436364	43.9	0.18	23.1	0.35
Copper	29.1	0.0442	1.28622	0.08	0.04	0.0032	1	0.55	2.3444	33.2	0.07	26.9	0.09
Manganese	4710	0.0442	208.182	91.2	0.04	3.648	1	0.55	385.1454545	9770	0.04	977	0.39
Nickel	230	0.0442	10.166	1.38	0.04	0.0552	1	0.55	18.584	79	0.24	57.2	0.32
Selenium	5.2	0.0442	0.22984	0.0005	0.04	0.00002	1	0.55	0.417927273	0.8	0.52	0.4	**1.04**
Silver	0.215	0.0442	0.009503	0.01	0.04	0.0004	1	0.55	0.018005455	39.7	0.00	3.97	0.00
Uranium	3640	0.0442	160.888	0.727	0.04	0.02908	1	0.55	292.5765091	1,600	0.18	160	**1.83**
Vanadium	28.2	0.0442	1.24644	0.00051	0.04	0.0000204	1	0.55	2.266291636	114	0.02	11.4	0.20
Zinc	598	0.0442	26.4316	3	0.04	0.12	1	0.55	48.27563636	224	0.22	10.5	**4.60**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 7. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00827	0.0045485	0.00025	0.0099	0.000002475	1	0.07	0.065013929	NS	N/A	NS	N/A
Arsenic	11.4	0.00827	0.094278	0.0007	0.0099	0.00000693	1	0.07	1.346927571	22.8	0.06	5.7	0.24
Barium	119	0.00827	0.98413	0.0165	0.0099	0.00016335	1	0.07	14.06133357	416.5	0.03	208.3	0.07
Beryllium	4.2	0.00827	0.034734	0.0032	0.0099	0.00003168	1	0.07	0.496652571	NS	N/A	NS	N/A
Cadmium	2.8	0.00827	0.023156	0.053	0.0099	0.0005247	1	0.07	0.338295714	3.4	0.10	0.85	0.40
Cobalt	99.2	0.00827	0.820384	0.06	0.0099	0.000594	1	0.07	11.72825714	43.9	0.27	23.1	0.51
Copper	29.1	0.00827	0.240657	0.08	0.0099	0.000792	1	0.07	3.449271429	33.2	0.10	26.9	0.13
Manganese	4710	0.00827	38.9517	91.2	0.0099	0.90288	1	0.07	569.3511429	9770	0.06	977	0.58
Nickel	230	0.00827	1.9021	1.38	0.0099	0.013662	1	0.07	27.36802857	79	0.35	57.2	0.48
Selenium	5.2	0.00827	0.043004	0.0005	0.0099	0.00000495	1	0.07	0.614413571	0.8	0.77	0.4	**1.54**
Silver	0.215	0.00827	0.00177805	0.01	0.0099	0.000099	1	0.07	0.026815	39.7	0.00	3.97	0.01
Uranium	3640	0.00827	30.1028	0.727	0.0099	0.0071973	1	0.07	430.1428186	1,600	0.27	160	**2.69**
Vanadium	28.2	0.00827	0.233214	0.00051	0.0099	0.000005049	1	0.07	3.3317007	114	0.03	11.4	0.29
Zinc	598	0.00827	4.94546	3	0.0099	0.0297	1	0.07	71.07371429	224	0.32	10.5	**6.77**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 7. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.0143	0.007865	0.00025	0.201	0.00005025	1	2.2	0.003597841	0.62	0.01	0.062	0.06
Arsenic	11.4	0.0143	0.16302	0.0007	0.201	0.0001407	1	2.2	0.074163955	9.63	0.01	1.91	0.04
Barium	119	0.0143	1.7017	0.0165	0.201	0.0033165	1	2.2	0.7750075	51	0.02	5.1	0.15
Beryllium	4.2	0.0143	0.06006	0.0032	0.201	0.0006432	1	2.2	0.027592364	6.2	0.00	0.62	0.04
Cadmium	2.8	0.0143	0.04004	0.053	0.201	0.010653	1	2.2	0.023042273	2.3	0.01	0.23	0.10
Cobalt	99.2	0.0143	1.41856	0.06	0.201	0.01206	1	2.2	0.650281818	20	0.03	5	0.13
Copper	29.1	0.0143	0.41613	0.08	0.201	0.01608	1	2.2	0.196459091	35.4	0.01	24.3	0.01
Manganese	4710	0.0143	67.353	91.2	0.201	18.3312	1	2.2	38.94736364	268	0.15	83	0.47
Nickel	230	0.0143	3.289	1.38	0.201	0.27738	1	2.2	1.621081818	42.1	0.04	23.1	0.07
Selenium	5.2	0.0143	0.07436	0.0005	0.201	0.0001005	1	2.2	0.033845682	0.25	0.14	0.025	**1.35**
Silver	0.215	0.0143	0.0030745	0.01	0.201	0.00201	1	2.2	0.002311136	2.7	0.00	0.27	0.01
Uranium	3640	0.0143	52.052	0.727	0.201	0.146127	1	2.2	23.72642136	5	**4.75**	0.5	**47.45**
Vanadium	28.2	0.0143	0.40326	0.00051	0.201	0.00010251	1	2.2	0.183346595	2.1	0.09	0.21	0.87
Zinc	598	0.0143	8.5514	3	0.201	0.603	1	2.2	4.161090909	225	0.02	22.5	0.18

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 2. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00184	0.001012	0.00025	0.057	0.00001425	1	0.541	0.00189695	0.62	0.00	0.062	0.03
Arsenic	11.4	0.00184	0.020976	0.0007	0.057	0.0000399	1	0.541	0.038846396	9.63	0.00	1.91	0.02
Barium	119	0.00184	0.21896	0.0165	0.057	0.0009405	1	0.541	0.406470425	51	0.01	5.1	0.08
Beryllium	4.2	0.00184	0.007728	0.0032	0.057	0.0001824	1	0.541	0.014621811	6.2	0.00	0.62	0.02
Cadmium	2.8	0.00184	0.005152	0.053	0.057	0.003021	1	0.541	0.015107209	2.3	0.01	0.23	0.07
Cobalt	99.2	0.00184	0.182528	0.06	0.057	0.00342	1	0.541	0.343711645	20	0.02	5	0.07
Copper	29.1	0.00184	0.053544	0.08	0.057	0.00456	1	0.541	0.107401109	35.4	0.00	24.3	0.00
Manganese	4710	0.00184	8.6664	91.2	0.057	5.1984	1	0.541	25.62809612	268	0.10	83	0.31
Nickel	230	0.00184	0.4232	1.38	0.057	0.07866	1	0.541	0.927652495	42.1	0.02	23.1	0.04
Selenium	5.2	0.00184	0.009568	0.0005	0.057	0.0000285	1	0.541	0.017738447	0.25	0.07	0.025	0.71
Silver	0.215	0.00184	0.0003956	0.01	0.057	0.00057	1	0.541	0.001784843	2.7	0.00	0.27	0.01
Uranium	3640	0.00184	6.6976	0.727	0.057	0.041439	1	0.541	12.45663401	5	**2.49**	0.5	**24.91**
Vanadium	28.2	0.00184	0.051888	0.00051	0.057	0.00002907	1	0.541	0.095965009	2.1	0.05	0.21	0.46
Zinc	598	0.00184	1.10032	3	0.057	0.171	1	0.541	2.349944547	225	0.01	22.5	0.10

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 13. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000687	0.0004122	0.0025	0.0665	0.00016625	1	0.5	0.0011569	0.62	0.002	0.062	0.019
Arsenic	12.8	0.000687	0.0087936	0.003	0.0665	0.0001995	1	0.5	0.0179862	9.63	0.002	1.91	0.009
Barium	79.9	0.000687	0.0548913	0.0206	0.0665	0.0013699	1	0.5	0.1125224	51	0.002	5.1	0.022
Beryllium	0.37	0.000687	0.00025419	0.00065	0.0665	0.000043225	1	0.5	0.00059483	6.2	0.000	0.62	0.001
Cadmium	0.12	0.000687	0.00008244	0.0005	0.0665	0.00003325	1	0.5	0.00023138	2.3	0.000	0.23	0.001
Cobalt	6.9	0.000687	0.0047403	0.0005	0.0665	0.00003325	1	0.5	0.0095471	20	0.000	5	0.002
Copper	11.3	0.000687	0.0077631	0.0086	0.0665	0.0005719	1	0.5	0.01667	35.4	0.000	24.3	0.001
Manganese	274	0.000687	0.188238	0.0183	0.0665	0.00121695	1	0.5	0.3789099	268	0.001	83	0.005
Nickel	11.5	0.000687	0.0079005	0.0005	0.0665	0.00003325	1	0.5	0.0158675	42.1	0.000	23.1	0.001
Selenium	0.475	0.000687	0.000326325	0.002	0.0665	0.000133	1	0.5	0.00091865	0.25	0.004	0.025	0.037
Silver	0.24	0.000687	0.00016488	0.001	0.0665	0.0000665	1	0.5	0.00046276	2.7	0.000	0.27	0.002
Uranium	2.6	0.000687	0.0017862	0.0005	0.0665	0.00003325	1	0.5	0.0036389	5	0.001	0.5	0.007
Vanadium	25.1	0.000687	0.0172437	0.0005	0.0665	0.00003325	1	0.5	0.0345539	2.1	0.016	0.21	0.165
Zinc	154	0.000687	0.105798	0.058	0.0665	0.003857	1	0.5	0.21931	225	0.001	22.5	0.010

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 13. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000576	0.0003456	0.0025	0.097	0.0002425	1	2.09	0.000281388	NS	N/A	NS	N/A
Arsenic	12.8	0.000576	0.0073728	0.003	0.097	0.000291	1	2.09	0.00366689	22.8	0.0002	5.7	0.001
Barium	79.9	0.000576	0.0460224	0.0206	0.097	0.0019982	1	2.09	0.022976364	416.5	0.0001	208.3	0.000
Beryllium	0.37	0.000576	0.00021312	0.00065	0.097	0.00006305	1	2.09	0.000132139	NS	N/A	NS	N/A
Cadmium	0.12	0.000576	0.00006912	0.0005	0.097	0.0000485	1	2.09	5.62775E-05	3.4	0.0000	0.85	0.000
Cobalt	6.9	0.000576	0.0039744	0.0005	0.097	0.0000485	1	2.09	0.001924833	43.9	0.0000	23.1	0.000
Copper	11.3	0.000576	0.0065088	0.0086	0.097	0.0008342	1	2.09	0.003513397	33.2	0.0001	26.9	0.000
Manganese	274	0.000576	0.157824	0.0183	0.097	0.0017751	1	2.09	0.076363206	9,770	0.0000	977	0.000
Nickel	11.5	0.000576	0.006624	0.0005	0.097	0.0000485	1	2.09	0.003192584	79	0.0000	57.2	0.000
Selenium	0.475	0.000576	0.0002736	0.002	0.097	0.000194	1	2.09	0.000223732	0.8	0.0003	0.4	0.001
Silver	0.24	0.000576	0.00013824	0.001	0.097	0.000097	1	2.09	0.000112555	39.7	0.0000	3.97	0.000
Uranium	2.6	0.000576	0.0014976	0.0005	0.097	0.0000485	1	2.09	0.000739761	1,600	0.0000	160	0.000
Vanadium	25.1	0.000576	0.0144576	0.0005	0.097	0.0000485	1	2.09	0.006940718	114	0.0001	11.4	0.001
Zinc	154	0.000576	0.088704	0.058	0.097	0.005626	1	2.09	0.045133971	224	0.0002	10.5	0.004

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 13. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000895	0.000537	0.0025	0.14	0.00035	1	3.63	0.000244353	NS	N/A	NS	N/A
Arsenic	12.8	0.000895	0.011456	0.003	0.14	0.00042	1	3.63	0.003271625	22.8	0.000	5.7	0.001
Barium	79.9	0.000895	0.0715105	0.0206	0.14	0.002884	1	3.63	0.020494353	416.5	0.000	208.3	0.000
Beryllium	0.37	0.000895	0.00033115	0.00065	0.14	0.000091	1	3.63	0.000116295	NS	N/A	NS	N/A
Cadmium	0.12	0.000895	0.0001074	0.0005	0.14	0.00007	1	3.63	4.88705E-05	3.4	0.000	0.85	0.000
Cobalt	6.9	0.000895	0.0061755	0.0005	0.14	0.00007	1	3.63	0.001720523	43.9	0.000	23.1	0.000
Copper	11.3	0.000895	0.0101135	0.0086	0.14	0.001204	1	3.63	0.003117769	33.2	0.000	26.9	0.000
Manganese	274	0.000895	0.24523	0.0183	0.14	0.002562	1	3.63	0.068262259	9,770	0.000	977	0.000
Nickel	11.5	0.000895	0.0102925	0.0005	0.14	0.00007	1	3.63	0.002854683	79	0.000	57.2	0.000
Selenium	0.475	0.000895	0.000425125	0.002	0.14	0.00028	1	3.63	0.000194249	0.8	0.000	0.4	0.000
Silver	0.24	0.000895	0.0002148	0.001	0.14	0.00014	1	3.63	9.7741E-05	39.7	0.000	3.97	0.000
Uranium	2.6	0.000895	0.002327	0.0005	0.14	0.00007	1	3.63	0.000660331	1,600	0.000	160	0.000
Vanadium	25.1	0.000895	0.0224645	0.0005	0.14	0.00007	1	3.63	0.006207851	114	0.000	11.4	0.001
Zinc	154	0.000895	0.13783	0.058	0.14	0.00812	1	3.63	0.040206612	224	0.000	10.5	0.004

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 13. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0442	0.02652	0.0025	0.04	0.0001	1	0.55	0.0484	NS	N/A	NS	N/A
Arsenic	12.8	0.0442	0.56576	0.003	0.04	0.00012	1	0.55	1.028872727	22.8	0.05	5.7	0.18
Barium	79.9	0.0442	3.53158	0.0206	0.04	0.000824	1	0.55	6.422552727	416.5	0.02	208.3	0.03
Beryllium	0.37	0.0442	0.016354	0.00065	0.04	0.000026	1	0.55	0.029781818	NS	N/A	NS	N/A
Cadmium	0.12	0.0442	0.005304	0.0005	0.04	0.00002	1	0.55	0.00968	3.4	0.00	0.85	0.01
Cobalt	6.9	0.0442	0.30498	0.0005	0.04	0.00002	1	0.55	0.554545455	43.9	0.01	23.1	0.02
Copper	11.3	0.0442	0.49946	0.0086	0.04	0.000344	1	0.55	0.908734545	33.2	0.03	26.9	0.03
Manganese	274	0.0442	12.1108	0.0183	0.04	0.000732	1	0.55	22.02096727	9770	0.00	977	0.02
Nickel	11.5	0.0442	0.5083	0.0005	0.04	0.00002	1	0.55	0.924218182	79	0.01	57.2	0.02
Selenium	0.475	0.0442	0.020995	0.002	0.04	0.00008	1	0.55	0.038318182	0.8	0.05	0.4	0.10
Silver	0.24	0.0442	0.010608	0.001	0.04	0.00004	1	0.55	0.01936	39.7	0.00	3.97	0.00
Uranium	2.6	0.0442	0.11492	0.0005	0.04	0.00002	1	0.55	0.208981818	1,600	0.00	160	0.00
Vanadium	25.1	0.0442	1.10942	0.0005	0.04	0.00002	1	0.55	2.017163636	114	0.02	11.4	0.18
Zinc	154	0.0442	6.8068	0.058	0.04	0.00232	1	0.55	12.38021818	224	0.06	10.5	**1.18**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 13. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00827	0.004962	0.0025	0.0099	0.00002475	1	0.07	0.071239286	NS	N/A	NS	N/A
Arsenic	12.8	0.00827	0.105856	0.003	0.0099	0.0000297	1	0.07	1.512652857	22.8	0.07	5.7	0.27
Barium	79.9	0.00827	0.660773	0.0206	0.0099	0.00020394	1	0.07	9.442527714	416.5	0.02	208.3	0.05
Beryllium	0.37	0.00827	0.0030599	0.00065	0.0099	0.000006435	1	0.07	0.043804786	NS	N/A	NS	N/A
Cadmium	0.12	0.00827	0.0009924	0.0005	0.0099	0.00000495	1	0.07	0.014247857	3.4	0.00	0.85	0.02
Cobalt	6.9	0.00827	0.057063	0.0005	0.0099	0.00000495	1	0.07	0.815256429	43.9	0.02	23.1	0.04
Copper	11.3	0.00827	0.093451	0.0086	0.0099	0.00008514	1	0.07	1.336230571	33.2	0.04	26.9	0.05
Manganese	274	0.00827	2.26598	0.0183	0.0099	0.00018117	1	0.07	32.373731	9770	0.00	977	0.03
Nickel	11.5	0.00827	0.095105	0.0005	0.0099	0.00000495	1	0.07	1.358713571	79	0.02	57.2	0.02
Selenium	0.475	0.00827	0.00392825	0.002	0.0099	0.0000198	1	0.07	0.056400714	0.8	0.07	0.4	0.14
Silver	0.24	0.00827	0.0019848	0.001	0.0099	0.0000099	1	0.07	0.028495714	39.7	0.00	3.97	0.01
Uranium	2.6	0.00827	0.021502	0.0005	0.0099	0.00000495	1	0.07	0.307242143	1,600	0.00	160	0.00
Vanadium	25.1	0.00827	0.207577	0.0005	0.0099	0.00000495	1	0.07	2.965456429	114	0.03	11.4	0.26
Zinc	154	0.00827	1.27358	0.058	0.0099	0.0005742	1	0.07	18.20220286	224	0.08	10.5	**1.73**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 13. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0143	0.00858	0.0025	0.201	0.0005025	1	2.2	0.004128409	0.62	0.01	0.062	0.07
Arsenic	12.8	0.0143	0.18304	0.003	0.201	0.000603	1	2.2	0.083474091	9.63	0.01	1.91	0.04
Barium	79.9	0.0143	1.14257	0.0206	0.201	0.0041406	1	2.2	0.521232091	51	0.01	5.1	0.10
Beryllium	0.37	0.0143	0.005291	0.00065	0.201	0.00013065	1	2.2	0.002464386	6.2	0.00	0.62	0.00
Cadmium	0.12	0.0143	0.001716	0.0005	0.201	0.0001005	1	2.2	0.000825682	2.3	0.00	0.23	0.00
Cobalt	6.9	0.0143	0.09867	0.0005	0.201	0.0001005	1	2.2	0.044895682	20	0.00	5	0.01
Copper	11.3	0.0143	0.16159	0.0086	0.201	0.0017286	1	2.2	0.074235727	35.4	0.00	24.3	0.00
Manganese	274	0.0143	3.9182	0.0183	0.201	0.0036783	1	2.2	1.782671955	268	0.01	83	0.02
Nickel	11.5	0.0143	0.16445	0.0005	0.201	0.0001005	1	2.2	0.074795682	42.1	0.00	23.1	0.00
Selenium	0.475	0.0143	0.0067925	0.002	0.201	0.000402	1	2.2	0.003270227	0.25	0.01	0.025	0.13
Silver	0.24	0.0143	0.003432	0.001	0.201	0.000201	1	2.2	0.001651364	2.7	0.00	0.27	0.01
Uranium	2.6	0.0143	0.03718	0.0005	0.201	0.0001005	1	2.2	0.016945682	5	0.00	0.5	0.03
Vanadium	25.1	0.0143	0.35893	0.0005	0.201	0.0001005	1	2.2	0.163195682	2.1	0.08	0.21	0.78
Zinc	154	0.0143	2.2022	0.058	0.201	0.011658	1	2.2	1.006299091	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 8. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00184	0.001104	0.0025	0.057	0.0001425	1	0.541	0.002304067	0.62	0.00	0.062	0.04
Arsenic	12.8	0.00184	0.023552	0.003	0.057	0.000171	1	0.541	0.043850277	9.63	0.00	1.91	0.02
Barium	79.9	0.00184	0.147016	0.0206	0.057	0.0011742	1	0.541	0.273919039	51	0.01	5.1	0.05
Beryllium	0.37	0.00184	0.0006808	0.00065	0.057	0.00003705	1	0.541	0.001326895	6.2	0.00	0.62	0.00
Cadmium	0.12	0.00184	0.0002208	0.0005	0.057	0.0000285	1	0.541	0.000460813	2.3	0.00	0.23	0.00
Cobalt	6.9	0.00184	0.012696	0.0005	0.057	0.0000285	1	0.541	0.023520333	20	0.00	5	0.00
Copper	11.3	0.00184	0.020792	0.0086	0.057	0.0004902	1	0.541	0.039338632	35.4	0.00	24.3	0.00
Manganese	274	0.00184	0.50416	0.0183	0.057	0.0010431	1	0.541	0.933831978	268	0.00	83	0.01
Nickel	11.5	0.00184	0.02116	0.0005	0.057	0.0000285	1	0.541	0.039165434	42.1	0.00	23.1	0.00
Selenium	0.475	0.00184	0.000874	0.002	0.057	0.000114	1	0.541	0.001826248	0.25	0.01	0.025	0.07
Silver	0.24	0.00184	0.0004416	0.001	0.057	0.000057	1	0.541	0.000921627	2.7	0.00	0.27	0.00
Uranium	2.6	0.00184	0.004784	0.0005	0.057	0.0000285	1	0.541	0.008895564	5	0.00	0.5	0.02
Vanadium	25.1	0.00184	0.046184	0.0005	0.057	0.0000285	1	0.541	0.085420518	2.1	0.04	0.21	0.41
Zinc	154	0.00184	0.28336	0.058	0.057	0.003306	1	0.541	0.529881701	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 12. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000687	0.00044655	0.0086	0.0665	0.0005719	1	0.5	0.0020369	0.62	0.003	0.062	0.033
Arsenic	11.9	0.000687	0.0081753	0.0019	0.0665	0.00012635	1	0.5	0.0166033	9.63	0.002	1.91	0.009
Barium	138	0.000687	0.094806	0.0616	0.0665	0.0040964	1	0.5	0.1978048	51	0.004	5.1	0.039
Beryllium	1.4	0.000687	0.0009618	0.00005	0.0665	0.000003325	1	0.5	0.00193025	6.2	0.000	0.62	0.003
Cadmium	1	0.000687	0.000687	0.0018	0.0665	0.0001197	1	0.5	0.0016134	2.3	0.001	0.23	0.007
Cobalt	16.5	0.000687	0.0113355	0.002	0.0665	0.000133	1	0.5	0.022937	20	0.001	5	0.005
Copper	16.2	0.000687	0.0111294	0.0141	0.0665	0.00093765	1	0.5	0.0241341	35.4	0.001	24.3	0.001
Manganese	3670	0.000687	2.52129	0.0903	0.0665	0.00600495	1	0.5	5.0545899	268	0.019	83	0.061
Nickel	51.4	0.000687	0.0353118	0.0083	0.0665	0.00055195	1	0.5	0.0717275	42.1	0.002	23.1	0.003
Selenium	0.55	0.000687	0.00037785	0.0005	0.0665	0.00003325	1	0.5	0.0008222	0.25	0.003	0.025	0.033
Silver	0.265	0.000687	0.000182055	0.00035	0.0665	0.000023275	1	0.5	0.00041066	2.7	0.000	0.27	0.002
Uranium	28.6	0.000687	0.0196482	0.027	0.0665	0.0017955	1	0.5	0.0428874	5	0.009	0.5	0.086
Vanadium	23.3	0.000687	0.0160071	0.0048	0.0665	0.0003192	1	0.5	0.0326526	2.1	0.016	0.21	0.155
Zinc	118	0.000687	0.081066	0.0522	0.0665	0.0034713	1	0.5	0.1690746	225	0.001	22.5	0.008

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 12. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000576	0.0003744	0.0086	0.097	0.0008342	1	2.09	0.000578278	NS	N/A	NS	N/A
Arsenic	11.9	0.000576	0.0068544	0.0019	0.097	0.0001843	1	2.09	0.003367799	22.8	0.0001	5.7	0.001
Barium	138	0.000576	0.079488	0.0616	0.097	0.0059752	1	2.09	0.040891483	416.5	0.0001	208.3	0.000
Beryllium	1.4	0.000576	0.0008064	0.00005	0.097	0.00000485	1	2.09	0.000388158	NS	N/A	NS	N/A
Cadmium	1	0.000576	0.000576	0.0018	0.097	0.0001746	1	2.09	0.000359139	3.4	0.0001	0.85	0.000
Cobalt	16.5	0.000576	0.009504	0.002	0.097	0.000194	1	2.09	0.004640191	43.9	0.0001	23.1	0.000
Copper	16.2	0.000576	0.0093312	0.0141	0.097	0.0013677	1	2.09	0.005119091	33.2	0.0002	26.9	0.000
Manganese	3670	0.000576	2.11392	0.0903	0.097	0.0087591	1	2.09	1.015635933	9,770	0.0001	977	0.001
Nickel	51.4	0.000576	0.0296064	0.0083	0.097	0.0008051	1	2.09	0.014550957	79	0.0002	57.2	0.000
Selenium	0.55	0.000576	0.0003168	0.0005	0.097	0.0000485	1	2.09	0.000174785	0.8	0.0002	0.4	0.000
Silver	0.265	0.000576	0.00015264	0.00035	0.097	0.00003395	1	2.09	8.92775E-05	39.7	0.0000	3.97	0.000
Uranium	28.6	0.000576	0.0164736	0.027	0.097	0.002619	1	2.09	0.009135215	1,600	0.0000	160	0.000
Vanadium	23.3	0.000576	0.0134208	0.0048	0.097	0.0004656	1	2.09	0.006644211	114	0.0001	11.4	0.001
Zinc	118	0.000576	0.067968	0.0522	0.097	0.0050634	1	2.09	0.034943254	224	0.0002	10.5	0.003

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 12. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000895	0.00058175	0.0086	0.14	0.001204	1	3.63	0.000491942	NS	N/A	NS	N/A
Arsenic	11.9	0.000895	0.0106505	0.0019	0.14	0.000266	1	3.63	0.0030073	22.8	0.000	5.7	0.001
Barium	138	0.000895	0.12351	0.0616	0.14	0.008624	1	3.63	0.036400551	416.5	0.000	208.3	0.000
Beryllium	1.4	0.000895	0.001253	0.00005	0.14	0.000007	1	3.63	0.000347107	NS	N/A	NS	N/A
Cadmium	1	0.000895	0.000895	0.0018	0.14	0.000252	1	3.63	0.000315978	3.4	0.000	0.85	0.000
Cobalt	16.5	0.000895	0.0147675	0.002	0.14	0.00028	1	3.63	0.004145317	43.9	0.000	23.1	0.000
Copper	16.2	0.000895	0.014499	0.0141	0.14	0.001974	1	3.63	0.004538017	33.2	0.000	26.9	0.000
Manganese	3670	0.000895	3.28465	0.0903	0.14	0.012642	1	3.63	0.908344904	9,770	0.000	977	0.001
Nickel	51.4	0.000895	0.046003	0.0083	0.14	0.001162	1	3.63	0.012993113	79	0.000	57.2	0.000
Selenium	0.55	0.000895	0.00049225	0.0005	0.14	0.00007	1	3.63	0.00015489	0.8	0.000	0.4	0.000
Silver	0.265	0.000895	0.000237175	0.00035	0.14	0.000049	1	3.63	7.88361E-05	39.7	0.000	3.97	0.000
Uranium	28.6	0.000895	0.025597	0.027	0.14	0.00378	1	3.63	0.008092837	1,600	0.000	160	0.000
Vanadium	23.3	0.000895	0.0208535	0.0048	0.14	0.000672	1	3.63	0.00592989	114	0.000	11.4	0.001
Zinc	118	0.000895	0.10561	0.0522	0.14	0.007308	1	3.63	0.031106887	224	0.000	10.5	0.003

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 12. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55						

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0442	0.02873	0.0086	0.04	0.000344	1	0.55	0.052861818	NS	N/A	NS	N/A
Arsenic	11.9	0.0442	0.52598	0.0019	0.04	0.000076	1	0.55	0.956465455	22.8	0.04	5.7	0.17
Barium	138	0.0442	6.0996	0.0616	0.04	0.002464	1	0.55	11.09466182	416.5	0.03	208.3	0.05
Beryllium	1.4	0.0442	0.06188	0.00005	0.04	0.000002	1	0.55	0.112512727	NS	N/A	NS	N/A
Cadmium	1	0.0442	0.0442	0.0018	0.04	0.000072	1	0.55	0.080494545	3.4	0.02	0.85	0.09
Cobalt	16.5	0.0442	0.7293	0.002	0.04	0.00008	1	0.55	1.326145455	43.9	0.03	23.1	0.06
Copper	16.2	0.0442	0.71604	0.0141	0.04	0.000564	1	0.55	1.302916364	33.2	0.04	26.9	0.05
Manganese	3670	0.0442	162.214	0.0903	0.04	0.003612	1	0.55	294.9411127	9770	0.03	977	0.30
Nickel	51.4	0.0442	2.27188	0.0083	0.04	0.000332	1	0.55	4.131294545	79	0.05	57.2	0.07
Selenium	0.55	0.0442	0.02431	0.0005	0.04	0.00002	1	0.55	0.044236364	0.8	0.06	0.4	0.11
Silver	0.265	0.0442	0.011713	0.00035	0.04	0.000014	1	0.55	0.021321818	39.7	0.00	3.97	0.01
Uranium	28.6	0.0442	1.26412	0.027	0.04	0.00108	1	0.55	2.300363636	1,600	0.00	160	0.01
Vanadium	23.3	0.0442	1.02986	0.0048	0.04	0.000192	1	0.55	1.872821818	114	0.02	11.4	0.16
Zinc	118	0.0442	5.2156	0.0522	0.04	0.002088	1	0.55	9.486705455	224	0.04	10.5	0.90

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 12. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00827	0.0053755	0.0086	0.0099	0.00008514	1	0.07	0.078009143	NS	N/A	NS	N/A
Arsenic	11.9	0.00827	0.098413	0.0019	0.0099	0.00001881	1	0.07	1.406168714	22.8	0.06	5.7	0.25
Barium	138	0.00827	1.14126	0.0616	0.0099	0.00060984	1	0.07	16.31242629	416.5	0.04	208.3	0.08
Beryllium	1.4	0.00827	0.011578	0.00005	0.0099	0.000000495	1	0.07	0.165407071	NS	N/A	NS	N/A
Cadmium	1	0.00827	0.00827	0.0018	0.0099	0.00001782	1	0.07	0.118397429	3.4	0.03	0.85	0.14
Cobalt	16.5	0.00827	0.136455	0.002	0.0099	0.0000198	1	0.07	1.94964	43.9	0.04	23.1	0.08
Copper	16.2	0.00827	0.133974	0.0141	0.0099	0.00013959	1	0.07	1.915908429	33.2	0.06	26.9	0.07
Manganese	3670	0.00827	30.3509	0.0903	0.0099	0.00089397	1	0.07	433.5970567	9770	0.04	977	0.44
Nickel	51.4	0.00827	0.425078	0.0083	0.0099	0.00008217	1	0.07	6.073716714	79	0.08	57.2	0.11
Selenium	0.55	0.00827	0.0045485	0.0005	0.0099	0.00000495	1	0.07	0.065049286	0.8	0.08	0.4	0.16
Silver	0.265	0.00827	0.00219155	0.00035	0.0099	0.000003465	1	0.07	0.031357357	39.7	0.00	3.97	0.01
Uranium	28.6	0.00827	0.236522	0.027	0.0099	0.0002673	1	0.07	3.382704286	1,600	0.00	160	0.02
Vanadium	23.3	0.00827	0.192691	0.0048	0.0099	0.00004752	1	0.07	2.753407429	114	0.02	11.4	0.24
Zinc	118	0.00827	0.97586	0.0522	0.0099	0.00051678	1	0.07	13.94823971	224	0.06	10.5	**1.33**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 12. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0143	0.009295	0.0086	0.201	0.0017286	1	2.2	0.005010727	0.62	0.01	0.062	0.08
Arsenic	11.9	0.0143	0.17017	0.0019	0.201	0.0003819	1	2.2	0.077523591	9.63	0.01	1.91	0.04
Barium	138	0.0143	1.9734	0.0616	0.201	0.0123816	1	2.2	0.902628	51	0.02	5.1	0.18
Beryllium	1.4	0.0143	0.02002	0.00005	0.201	0.00001005	1	2.2	0.009104568	6.2	0.00	0.62	0.01
Cadmium	1	0.0143	0.0143	0.0018	0.201	0.0003618	1	2.2	0.006664455	2.3	0.00	0.23	0.03
Cobalt	16.5	0.0143	0.23595	0.002	0.201	0.000402	1	2.2	0.107432727	20	0.01	5	0.02
Copper	16.2	0.0143	0.23166	0.0141	0.201	0.0028341	1	2.2	0.106588227	35.4	0.00	24.3	0.00
Manganese	3670	0.0143	52.481	0.0903	0.201	0.0181503	1	2.2	23.86325014	268	0.09	83	0.29
Nickel	51.4	0.0143	0.73502	0.0083	0.201	0.0016683	1	2.2	0.334858318	42.1	0.01	23.1	0.01
Selenium	0.55	0.0143	0.007865	0.0005	0.201	0.0001005	1	2.2	0.003620682	0.25	0.01	0.025	0.14
Silver	0.265	0.0143	0.0037895	0.00035	0.201	0.00007035	1	2.2	0.001754477	2.7	0.00	0.27	0.01
Uranium	28.6	0.0143	0.40898	0.027	0.201	0.005427	1	2.2	0.188366818	5	0.04	0.5	0.38
Vanadium	23.3	0.0143	0.33319	0.0048	0.201	0.0009648	1	2.2	0.151888545	2.1	0.07	0.21	0.72
Zinc	118	0.0143	1.6874	0.0522	0.201	0.0104922	1	2.2	0.771769182	225	0.00	22.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 7. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057	0.18216		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00184	0.001196	0.0086	0.057	0.18216	0	1	0.541	0.003116821	0.62	0.01	0.062	0.05
Arsenic	11.9	0.00184	0.021896	0.0019	0.057	0.18216	0	1	0.541	0.040673383	9.63	0.00	1.91	0.02
Barium	138	0.00184	0.25392	0.0616	0.057	0.18216	0	1	0.541	0.475843253	51	0.01	5.1	0.09
Beryllium	1.4	0.00184	0.002576	0.00005	0.057	0.18216	0	1	0.541	0.004766821	6.2	0.00	0.62	0.01
Cadmium	1	0.00184	0.00184	0.0018	0.057	0.18216	0	1	0.541	0.003590758	2.3	0.00	0.23	0.02
Cobalt	16.5	0.00184	0.03036	0.002	0.057	0.18216	0	1	0.541	0.05632902	20	0.00	5	0.01
Copper	16.2	0.00184	0.029808	0.0141	0.057	0.18216	0	1	0.541	0.056583549	35.4	0.00	24.3	0.00
Manganese	3670	0.00184	6.7528	0.0903	0.057	0.18216	0	1	0.541	12.49158429	268	0.05	83	0.15
Nickel	51.4	0.00184	0.094576	0.0083	0.057	0.18216	0	1	0.541	0.175691497	42.1	0.00	23.1	0.01
Selenium	0.55	0.00184	0.001012	0.0005	0.057	0.18216	0	1	0.541	0.00192329	0.25	0.01	0.025	0.08
Silver	0.265	0.00184	0.0004876	0.00035	0.057	0.18216	0	1	0.541	0.00093817	2.7	0.00	0.27	0.00
Uranium	28.6	0.00184	0.052624	0.027	0.057	0.18216	0	1	0.541	0.100116451	5	0.02	0.5	0.20
Vanadium	23.3	0.00184	0.042872	0.0048	0.057	0.18216	0	1	0.541	0.079751571	2.1	0.04	0.21	0.38
Zinc	118	0.00184	0.21712	0.0522	0.057	0.18216	0	1	0.541	0.406830684	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 9. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.000687	0.0008244	0.0022	0.0665	0.0001463	1	0.5	0.0019414	0.62	0.003	0.062	0.031
Arsenic	14.7	0.000687	0.0100989	0.002	0.0665	0.000133	1	0.5	0.0204638	9.63	0.002	1.91	0.011
Barium	254	0.000687	0.174498	0.077	0.0665	0.0051205	1	0.5	0.359237	51	0.007	5.1	0.070
Beryllium	3.8	0.000687	0.0026106	0.00005	0.0665	0.000003325	1	0.5	0.00522785	6.2	0.001	0.62	0.008
Cadmium	9.6	0.000687	0.0065952	0.0026	0.0665	0.0001729	1	0.5	0.0135362	2.3	0.006	0.23	0.059
Cobalt	35.9	0.000687	0.0246633	0.0014	0.0665	0.0000931	1	0.5	0.0495128	20	0.002	5	0.010
Copper	29.8	0.000687	0.0204726	0.047	0.0665	0.0031255	1	0.5	0.0471962	35.4	0.001	24.3	0.002
Manganese	24300	0.000687	16.6941	4.74	0.0665	0.31521	1	0.5	34.01862	268	0.127	83	0.410
Nickel	309	0.000687	0.212283	0.11	0.0665	0.007315	1	0.5	0.439196	42.1	0.010	23.1	0.019
Selenium	16	0.000687	0.010992	0.0005	0.0665	0.00003325	1	0.5	0.0220505	0.25	0.088	0.025	0.882
Silver	0.1	0.000687	0.0000687	0.01	0.0665	0.000665	1	0.5	0.0014674	2.7	0.001	0.27	0.005
Uranium	83.8	0.000687	0.0575706	0.078	0.0665	0.005187	1	0.5	0.1255152	5	0.025	0.5	0.251
Vanadium	33.8	0.000687	0.0232206	0.00058	0.0665	0.00003857	1	0.5	0.04651834	2.1	0.022	0.21	0.222
Zinc	395	0.000687	0.271365	0.1	0.0665	0.00665	1	0.5	0.55603	225	0.002	22.5	0.025

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 9. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097		1	2.09					
Antimony	1.2	0.000576	0.0006912	0.0022	0.097	0.0002134	1	2.09	0.000432823	NS	N/A	NS	N/A
Arsenic	14.7	0.000576	0.0084672	0.002	0.097	0.000194	1	2.09	0.004144115	22.8	0.0002	5.7	0.001
Barium	254	0.000576	0.146304	0.077	0.097	0.007469	1	2.09	0.073575598	416.5	0.0002	208.3	0.000
Beryllium	3.8	0.000576	0.0021888	0.00005	0.097	0.00000485	1	2.09	0.001049593	NS	N/A	NS	N/A
Cadmium	9.6	0.000576	0.0055296	0.0026	0.097	0.0002522	1	2.09	0.002766411	3.4	0.0008	0.85	0.003
Cobalt	35.9	0.000576	0.0206784	0.0014	0.097	0.0001358	1	2.09	0.009958947	43.9	0.0002	23.1	0.000
Copper	29.8	0.000576	0.0171648	0.047	0.097	0.004559	1	2.09	0.010394163	33.2	0.0003	26.9	0.000
Manganese	24300	0.000576	13.9968	4.74	0.097	0.45978	1	2.09	6.917023923	9,770	0.0007	977	0.007
Nickel	309	0.000576	0.177984	0.11	0.097	0.01067	1	2.09	0.090265072	79	0.0011	57.2	0.002
Selenium	16	0.000576	0.009216	0.0005	0.097	0.0000485	1	2.09	0.004432775	0.8	0.0055	0.4	0.011
Silver	0.1	0.000576	0.0000576	0.01	0.097	0.00097	1	2.09	0.000491675	39.7	0.0000	3.97	0.000
Uranium	83.8	0.000576	0.0482688	0.078	0.097	0.007566	1	2.09	0.026715215	1,600	0.0000	160	0.000
Vanadium	33.8	0.000576	0.0194688	0.00058	0.097	0.00005626	1	2.09	0.009342134	114	0.0001	11.4	0.001
Zinc	395	0.000576	0.22752	0.1	0.097	0.0097	1	2.09	0.113502392	224	0.0005	10.5	0.011

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 9. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.000895	0.001074	0.0022	0.14	0.000308	1	3.63	0.000380716	NS	N/A	NS	N/A
Arsenic	14.7	0.000895	0.0131565	0.002	0.14	0.00028	1	3.63	0.003701515	22.8	0.000	5.7	0.001
Barium	254	0.000895	0.22733	0.077	0.14	0.01078	1	3.63	0.065595041	416.5	0.000	208.3	0.000
Beryllium	3.8	0.000895	0.003401	0.00005	0.14	0.000007	1	3.63	0.000938843	NS	N/A	NS	N/A
Cadmium	9.6	0.000895	0.008592	0.0026	0.14	0.000364	1	3.63	0.002467218	3.4	0.001	0.85	0.003
Cobalt	35.9	0.000895	0.0321305	0.0014	0.14	0.000196	1	3.63	0.008905372	43.9	0.000	23.1	0.000
Copper	29.8	0.000895	0.026671	0.047	0.14	0.00658	1	3.63	0.009160055	33.2	0.000	26.9	0.000
Manganese	24300	0.000895	21.7485	4.74	0.14	0.6636	1	3.63	6.174132231	9,770	0.001	977	0.006
Nickel	309	0.000895	0.276555	0.11	0.14	0.0154	1	3.63	0.080428375	79	0.001	57.2	0.001
Selenium	16	0.000895	0.01432	0.0005	0.14	0.00007	1	3.63	0.003964187	0.8	0.005	0.4	0.010
Silver	0.1	0.000895	0.0000895	0.01	0.14	0.0014	1	3.63	0.000410331	39.7	0.000	3.97	0.000
Uranium	83.8	0.000895	0.075001	0.078	0.14	0.01092	1	3.63	0.023669697	1,600	0.000	160	0.000
Vanadium	33.8	0.000895	0.030251	0.00058	0.14	0.0000812	1	3.63	0.008355978	114	0.000	11.4	0.001
Zinc	395	0.000895	0.353525	0.1	0.14	0.014	1	3.63	0.101246556	224	0.000	10.5	0.010

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 9. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.0442	0.05304	0.0022	0.04	0.000088	1	0.55	0.096596364	NS	N/A	NS	N/A
Arsenic	14.7	0.0442	0.64974	0.002	0.04	0.00008	1	0.55	1.181490909	22.8	0.05	5.7	0.21
Barium	254	0.0442	11.2268	0.077	0.04	0.00308	1	0.55	20.41796364	416.5	0.05	208.3	0.10
Beryllium	3.8	0.0442	0.16796	0.00005	0.04	0.000002	1	0.55	0.305385455	NS	N/A	NS	N/A
Cadmium	9.6	0.0442	0.42432	0.0026	0.04	0.000104	1	0.55	0.77168	3.4	0.23	0.85	0.91
Cobalt	35.9	0.0442	1.58678	0.0014	0.04	0.000056	1	0.55	2.885156364	43.9	0.07	23.1	0.12
Copper	29.8	0.0442	1.31716	0.047	0.04	0.00188	1	0.55	2.398254545	33.2	0.07	26.9	0.09
Manganese	24300	0.0442	1074.06	4.74	0.04	0.1896	1	0.55	1953.181091	9770	0.20	977	**2.00**
Nickel	309	0.0442	13.6578	0.11	0.04	0.0044	1	0.55	24.84036364	79	0.31	57.2	0.43
Selenium	16	0.0442	0.7072	0.0005	0.04	0.00002	1	0.55	1.285854545	0.8	**1.61**	0.4	**3.21**
Silver	0.1	0.0442	0.00442	0.01	0.04	0.0004	1	0.55	0.008763636	39.7	0.00	3.97	0.00
Uranium	83.8	0.0442	3.70396	0.078	0.04	0.00312	1	0.55	6.740145455	1,600	0.00	160	0.04
Vanadium	33.8	0.0442	1.49396	0.00058	0.04	0.0000232	1	0.55	2.716333091	114	0.02	11.4	0.24
Zinc	395	0.0442	17.459	0.1	0.04	0.004	1	0.55	31.75090909	224	0.14	10.5	**3.02**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 9. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.00827	0.009924	0.0022	0.0099	0.00002178	1	0.07	0.142082571	NS	N/A	NS	N/A
Arsenic	14.7	0.00827	0.121569	0.002	0.0099	0.0000198	1	0.07	1.736982857	22.8	0.08	5.7	0.30
Barium	254	0.00827	2.10058	0.077	0.0099	0.0007623	1	0.07	30.01917571	416.5	0.07	208.3	0.14
Beryllium	3.8	0.00827	0.031426	0.00005	0.0099	0.000000495	1	0.07	0.448949929	NS	N/A	NS	N/A
Cadmium	9.6	0.00827	0.079392	0.0026	0.0099	0.00002574	1	0.07	1.134539143	3.4	0.33	0.85	**1.33**
Cobalt	35.9	0.00827	0.296893	0.0014	0.0099	0.00001386	1	0.07	4.241526571	43.9	0.10	23.1	0.18
Copper	29.8	0.00827	0.246446	0.047	0.0099	0.0004653	1	0.07	3.527304286	33.2	0.11	26.9	0.13
Manganese	24300	0.00827	200.961	4.74	0.0099	0.046926	1	0.07	2871.5418	9770	0.29	977	**2.94**
Nickel	309	0.00827	2.55543	0.11	0.0099	0.001089	1	0.07	36.5217	79	0.46	57.2	0.64
Selenium	16	0.00827	0.13232	0.0005	0.0099	0.00000495	1	0.07	1.890356429	0.8	**2.36**	0.4	**4.73**
Silver	0.1	0.00827	0.000827	0.01	0.0099	0.000099	1	0.07	0.013228571	39.7	0.00	3.97	0.00
Uranium	83.8	0.00827	0.693026	0.078	0.0099	0.0007722	1	0.07	9.911402857	1,600	0.01	160	0.06
Vanadium	33.8	0.00827	0.279526	0.00058	0.0099	0.000005742	1	0.07	3.9933106	114	0.04	11.4	0.35
Zinc	395	0.00827	3.26665	0.1	0.0099	0.00099	1	0.07	46.68057143	224	0.21	10.5	**4.45**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 9. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.0143	0.01716	0.0022	0.201	0.0004422	1	2.2	0.008001	0.62	0.01	0.062	0.13
Arsenic	14.7	0.0143	0.21021	0.002	0.201	0.000402	1	2.2	0.095732727	9.63	0.01	1.91	0.05
Barium	254	0.0143	3.6322	0.077	0.201	0.015477	1	2.2	1.658035	51	0.03	5.1	0.33
Beryllium	3.8	0.0143	0.05434	0.00005	0.201	0.00001005	1	2.2	0.024704568	6.2	0.00	0.62	0.04
Cadmium	9.6	0.0143	0.13728	0.0026	0.201	0.0005226	1	2.2	0.062637545	2.3	0.03	0.23	0.27
Cobalt	35.9	0.0143	0.51337	0.0014	0.201	0.0002814	1	2.2	0.233477909	20	0.01	5	0.05
Copper	29.8	0.0143	0.42614	0.047	0.201	0.009447	1	2.2	0.197994091	35.4	0.01	24.3	0.01
Manganese	24300	0.0143	347.49	4.74	0.201	0.95274	1	2.2	158.3830636	268	0.59	83	**1.91**
Nickel	309	0.0143	4.4187	0.11	0.201	0.02211	1	2.2	2.01855	42.1	0.05	23.1	0.09
Selenium	16	0.0143	0.2288	0.0005	0.201	0.0001005	1	2.2	0.104045682	0.25	0.42	0.025	**4.16**
Silver	0.1	0.0143	0.00143	0.01	0.201	0.00201	1	2.2	0.001563636	2.7	0.00	0.27	0.01
Uranium	83.8	0.0143	1.19834	0.078	0.201	0.015678	1	2.2	0.551826364	5	0.11	0.5	**1.10**
Vanadium	33.8	0.0143	0.48334	0.00058	0.201	0.00011658	1	2.2	0.219752991	2.1	0.10	0.21	**1.05**
Zinc	395	0.0143	5.6485	0.1	0.201	0.0201	1	2.2	2.576636364	225	0.01	22.5	0.11

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 4. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.00184	0.002208	0.0022	0.057	0.0001254	1	0.541	0.004313124	0.62	0.01	0.062	0.07
Arsenic	14.7	0.00184	0.027048	0.002	0.057	0.000114	1	0.541	0.050207024	9.63	0.01	1.91	0.03
Barium	254	0.00184	0.46736	0.077	0.057	0.004389	1	0.541	0.871994455	51	0.02	5.1	0.17
Beryllium	3.8	0.00184	0.006992	0.00005	0.057	0.00000285	1	0.541	0.012929482	6.2	0.00	0.62	0.02
Cadmium	9.6	0.00184	0.017664	0.0026	0.057	0.0001482	1	0.541	0.032924584	2.3	0.01	0.23	0.14
Cobalt	35.9	0.00184	0.066056	0.0014	0.057	0.0000798	1	0.541	0.12224732	20	0.01	5	0.02
Copper	29.8	0.00184	0.054832	0.047	0.057	0.002679	1	0.541	0.106304991	35.4	0.00	24.3	0.00
Manganese	24300	0.00184	44.712	4.74	0.057	0.27018	1	0.541	83.1463586	268	0.31	83	**1.00**
Nickel	309	0.00184	0.56856	0.11	0.057	0.00627	1	0.541	1.062532348	42.1	0.03	23.1	0.05
Selenium	16	0.00184	0.02944	0.0005	0.057	0.0000285	1	0.541	0.054470425	0.25	0.22	0.025	**2.18**
Silver	0.1	0.00184	0.000184	0.01	0.057	0.00057	1	0.541	0.001393715	2.7	0.00	0.27	0.01
Uranium	83.8	0.00184	0.154192	0.078	0.057	0.004446	1	0.541	0.293231054	5	0.06	0.5	0.59
Vanadium	33.8	0.00184	0.062192	0.00058	0.057	0.00003306	1	0.541	0.115018595	2.1	0.05	0.21	0.55
Zinc	395	0.00184	0.7268	0.1	0.057	0.0057	1	0.541	1.353974122	225	0.01	22.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 11. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000687	0.0004122	0.0073	0.0665	0.00048545	1	0.5	0.0017953	0.62	0.003	0.062	0.029
Arsenic	80	0.000687	0.05496	0.0018	0.0665	0.0001197	1	0.5	0.1101594	9.63	0.011	1.91	0.058
Barium	663	0.000687	0.455481	0.054	0.0665	0.003591	1	0.5	0.918144	51	0.018	5.1	0.180
Beryllium	2.68	0.000687	0.00184116	0.00005	0.0665	0.000003325	1	0.5	0.00368897	6.2	0.001	0.62	0.006
Cadmium	9.6	0.000687	0.0065952	0.0024	0.0665	0.0001596	1	0.5	0.0135096	2.3	0.006	0.23	0.059
Cobalt	139	0.000687	0.095493	0.00025	0.0665	0.000016625	1	0.5	0.19101925	20	0.010	5	0.038
Copper	20	0.000687	0.01374	0.04	0.0665	0.00266	1	0.5	0.0328	35.4	0.001	24.3	0.001
Manganese	63300	0.000687	43.4871	1.07	0.0665	0.071155	1	0.5	87.11651	268	0.325	83	**1.050**
Nickel	460	0.000687	0.31602	0.02	0.0665	0.00133	1	0.5	0.6347	42.1	0.015	23.1	0.027
Selenium	1.4	0.000687	0.0009618	0.0046	0.0665	0.0003059	1	0.5	0.0025354	0.25	0.010	0.025	0.101
Silver	0.09	0.000687	0.00006183	0.01	0.0665	0.000665	1	0.5	0.00145366	2.7	0.001	0.27	0.005
Uranium	47	0.000687	0.032289	0.1	0.0665	0.00665	1	0.5	0.077878	5	0.016	0.5	0.156
Vanadium	25.9	0.000687	0.0177933	0.0049	0.0665	0.00032585	1	0.5	0.0362383	2.1	0.017	0.21	0.173
Zinc	520	0.000687	0.35724	0.07	0.0665	0.004655	1	0.5	0.72379	225	0.003	22.5	0.032

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 11. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097		1	2.09					
Antimony	0.6	0.000576	0.0003456	0.0073	0.097	0.0007081	1	2.09	0.000504163	NS	N/A	NS	N/A
Arsenic	80	0.000576	0.04608	0.0018	0.097	0.0001746	1	2.09	0.022131388	22.8	0.0010	5.7	0.004
Barium	663	0.000576	0.381888	0.054	0.097	0.005238	1	2.09	0.185227751	416.5	0.0004	208.3	0.001
Beryllium	2.68	0.000576	0.00154368	0.00005	0.097	0.00000485	1	2.09	0.000740923	NS	N/A	NS	N/A
Cadmium	9.6	0.000576	0.0055296	0.0024	0.097	0.0002328	1	2.09	0.002757129	3.4	0.0008	0.85	0.003
Cobalt	139	0.000576	0.080064	0.00025	0.097	0.00002425	1	2.09	0.038319737	43.9	0.0009	23.1	0.002
Copper	20	0.000576	0.01152	0.04	0.097	0.00388	1	2.09	0.007368421	33.2	0.0002	26.9	0.000
Manganese	63300	0.000576	36.4608	1.07	0.097	0.10379	1	2.09	17.49501914	9,770	0.0018	977	0.018
Nickel	460	0.000576	0.26496	0.02	0.097	0.00194	1	2.09	0.127703349	79	0.0016	57.2	0.002
Selenium	1.4	0.000576	0.0008064	0.0046	0.097	0.0004462	1	2.09	0.00059933	0.8	0.0007	0.4	0.001
Silver	0.09	0.000576	0.00005184	0.01	0.097	0.00097	1	2.09	0.000488919	39.7	0.0000	3.97	0.000
Uranium	47	0.000576	0.027072	0.1	0.097	0.0097	1	2.09	0.017594258	1,600	0.0000	160	0.000
Vanadium	25.9	0.000576	0.0149184	0.0049	0.097	0.0004753	1	2.09	0.007365407	114	0.0001	11.4	0.001
Zinc	520	0.000576	0.29952	0.07	0.097	0.00679	1	2.09	0.146559809	224	0.0007	10.5	0.014

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 11. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000895	0.000537	0.0073	0.14	0.001022	1	3.63	0.000429477	NS	N/A	NS	N/A
Arsenic	80	0.000895	0.0716	0.0018	0.14	0.000252	1	3.63	0.019793939	22.8	0.001	5.7	0.003
Barium	663	0.000895	0.593385	0.054	0.14	0.00756	1	3.63	0.165549587	416.5	0.000	208.3	0.001
Beryllium	2.68	0.000895	0.0023986	0.00005	0.14	0.000007	1	3.63	0.0006627	NS	N/A	NS	N/A
Cadmium	9.6	0.000895	0.008592	0.0024	0.14	0.000336	1	3.63	0.002459504	3.4	0.001	0.85	0.003
Cobalt	139	0.000895	0.124405	0.00025	0.14	0.000035	1	3.63	0.034280992	43.9	0.001	23.1	0.001
Copper	20	0.000895	0.0179	0.04	0.14	0.0056	1	3.63	0.006473829	33.2	0.000	26.9	0.000
Manganese	63300	0.000895	56.6535	1.07	0.14	0.1498	1	3.63	15.64829201	9,770	0.002	977	0.016
Nickel	460	0.000895	0.4117	0.02	0.14	0.0028	1	3.63	0.114187328	79	0.001	57.2	0.002
Selenium	1.4	0.000895	0.001253	0.0046	0.14	0.000644	1	3.63	0.00052259	0.8	0.001	0.4	0.001
Silver	0.09	0.000895	0.00008055	0.01	0.14	0.0014	1	3.63	0.000407865	39.7	0.000	3.97	0.000
Uranium	47	0.000895	0.042065	0.1	0.14	0.014	1	3.63	0.015444904	1,600	0.000	160	0.000
Vanadium	25.9	0.000895	0.0231805	0.0049	0.14	0.000686	1	3.63	0.006574793	114	0.000	11.4	0.001
Zinc	520	0.000895	0.4654	0.07	0.14	0.0098	1	3.63	0.130909091	224	0.001	10.5	0.012

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 11. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0442			0.04		1	0.55					
Antimony	0.6	0.0442	0.02652	0.0073	0.04	0.000292	1	0.55	0.048749091	NS	N/A	NS	N/A
Arsenic	80	0.0442	3.536	0.0018	0.04	0.000072	1	0.55	6.429221818	22.8	0.28	5.7	**1.13**
Barium	663	0.0442	29.3046	0.054	0.04	0.00216	1	0.55	53.28501818	416.5	0.13	208.3	0.26
Beryllium	2.68	0.0442	0.118456	0.00005	0.04	0.000002	1	0.55	0.215378182	NS	N/A	NS	N/A
Cadmium	9.6	0.0442	0.42432	0.0024	0.04	0.000096	1	0.55	0.771665455	3.4	0.23	0.85	0.91
Cobalt	139	0.0442	6.1438	0.00025	0.04	0.00001	1	0.55	11.17056364	43.9	0.25	23.1	0.48
Copper	20	0.0442	0.884	0.04	0.04	0.0016	1	0.55	1.610181818	33.2	0.05	26.9	0.06
Manganese	63300	0.0442	2797.86	1.07	0.04	0.0428	1	0.55	5087.096	9770	0.52	977	**5.21**
Nickel	460	0.0442	20.332	0.02	0.04	0.0008	1	0.55	36.96872727	79	0.47	57.2	0.65
Selenium	1.4	0.0442	0.06188	0.0046	0.04	0.000184	1	0.55	0.112843636	0.8	0.14	0.4	0.28
Silver	0.09	0.0442	0.003978	0.01	0.04	0.0004	1	0.55	0.00796	39.7	0.00	3.97	0.00
Uranium	47	0.0442	2.0774	0.1	0.04	0.004	1	0.55	3.784363636	1,600	0.00	160	0.02
Vanadium	25.9	0.0442	1.14478	0.0049	0.04	0.000196	1	0.55	2.081774545	114	0.02	11.4	0.18
Zinc	520	0.0442	22.984	0.07	0.04	0.0028	1	0.55	41.79418182	224	0.19	10.5	**3.98**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
N/A:	Value could not be calculated with the information available

TABLE PN 11. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00827	0.004962	0.0073	0.0099	0.00007227	1	0.07	0.071918143	NS	N/A	NS	N/A
Arsenic	80	0.00827	0.6616	0.0018	0.0099	0.00001782	1	0.07	9.451683143	22.8	0.41	5.7	**1.66**
Barium	663	0.00827	5.48301	0.054	0.0099	0.0005346	1	0.07	78.33635143	416.5	0.19	208.3	0.38
Beryllium	2.68	0.00827	0.0221636	0.00005	0.0099	0.000000495	1	0.07	0.316629929	NS	N/A	NS	N/A
Cadmium	9.6	0.00827	0.079392	0.0024	0.0099	0.00002376	1	0.07	1.134510857	3.4	0.33	0.85	**1.33**
Cobalt	139	0.00827	1.14953	0.00025	0.0099	0.000002475	1	0.07	16.4218925	43.9	0.37	23.1	0.71
Copper	20	0.00827	0.1654	0.04	0.0099	0.000396	1	0.07	2.368514286	33.2	0.07	26.9	0.09
Manganese	63300	0.00827	523.491	1.07	0.0099	0.010593	1	0.07	7478.594186	9770	0.77	977	**7.65**
Nickel	460	0.00827	3.8042	0.02	0.0099	0.000198	1	0.07	54.34854286	79	0.69	57.2	0.95
Selenium	1.4	0.00827	0.011578	0.0046	0.0099	0.00004554	1	0.07	0.166050571	0.8	0.21	0.4	0.42
Silver	0.09	0.00827	0.0007443	0.01	0.0099	0.000099	1	0.07	0.012047143	39.7	0.00	3.97	0.00
Uranium	47	0.00827	0.38869	0.1	0.0099	0.00099	1	0.07	5.566857143	1,600	0.00	160	0.03
Vanadium	25.9	0.00827	0.214193	0.0049	0.0099	0.00004851	1	0.07	3.060593	114	0.03	11.4	0.27
Zinc	520	0.00827	4.3004	0.07	0.0099	0.000693	1	0.07	61.44418571	224	0.27	10.5	**5.85**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 11. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0143	0.00858	0.0073	0.201	0.0014673	1	2.2	0.004566955	0.62	0.01	0.062	0.07
Arsenic	80	0.0143	1.144	0.0018	0.201	0.0003618	1	2.2	0.520164455	9.63	0.05	1.91	0.27
Barium	663	0.0143	9.4809	0.054	0.201	0.010854	1	2.2	4.314433636	51	0.08	5.1	0.85
Beryllium	2.68	0.0143	0.038324	0.00005	0.201	0.00001005	1	2.2	0.017424568	6.2	0.00	0.62	0.03
Cadmium	9.6	0.0143	0.13728	0.0024	0.201	0.0004824	1	2.2	0.062619273	2.3	0.03	0.23	0.27
Cobalt	139	0.0143	1.9877	0.00025	0.201	0.00005025	1	2.2	0.903522841	20	0.05	5	0.18
Copper	20	0.0143	0.286	0.04	0.201	0.00804	1	2.2	0.133654545	35.4	0.00	24.3	0.01
Manganese	63300	0.0143	905.19	1.07	0.201	0.21507	1	2.2	411.5477591	268	**1.54**	83	**4.96**
Nickel	460	0.0143	6.578	0.02	0.201	0.00402	1	2.2	2.991827273	42.1	0.07	23.1	0.13
Selenium	1.4	0.0143	0.02002	0.0046	0.201	0.0009246	1	2.2	0.009520273	0.25	0.04	0.025	0.38
Silver	0.09	0.0143	0.001287	0.01	0.201	0.00201	1	2.2	0.001498636	2.7	0.00	0.27	0.01
Uranium	47	0.0143	0.6721	0.1	0.201	0.0201	1	2.2	0.314636364	5	0.06	0.5	0.63
Vanadium	25.9	0.0143	0.37037	0.0049	0.201	0.0009849	1	2.2	0.168797682	2.1	0.08	0.21	0.80
Zinc	520	0.0143	7.436	0.07	0.201	0.01407	1	2.2	3.386395455	225	0.02	22.5	0.15

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 6. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00184	0.001104	0.0073	0.057	0.0004161	1	0.541	0.002809797	0.62	0.00	0.062	0.05
Arsenic	80	0.00184	0.1472	0.0018	0.057	0.0001026	1	0.541	0.272278373	9.63	0.03	1.91	0.14
Barium	663	0.00184	1.21992	0.054	0.057	0.003078	1	0.541	2.260624769	51	0.04	5.1	0.44
Beryllium	2.68	0.00184	0.0049312	0.00005	0.057	0.00000285	1	0.541	0.00912024	6.2	0.00	0.62	0.01
Cadmium	9.6	0.00184	0.017664	0.0024	0.057	0.0001368	1	0.541	0.032903512	2.3	0.01	0.23	0.14
Cobalt	139	0.00184	0.25576	0.00025	0.057	0.00001425	1	0.541	0.472780499	20	0.02	5	0.09
Copper	20	0.00184	0.0368	0.04	0.057	0.00228	1	0.541	0.072236599	35.4	0.00	24.3	0.00
Manganese	63300	0.00184	116.472	1.07	0.057	0.06099	1	0.541	215.402939	268	0.80	83	**2.60**
Nickel	460	0.00184	0.8464	0.02	0.057	0.00114	1	0.541	1.566617375	42.1	0.04	23.1	0.07
Selenium	1.4	0.00184	0.002576	0.0046	0.057	0.0002622	1	0.541	0.005246211	0.25	0.02	0.025	0.21
Silver	0.09	0.00184	0.0001656	0.01	0.057	0.00057	1	0.541	0.001359704	2.7	0.00	0.27	0.01
Uranium	47	0.00184	0.08648	0.1	0.057	0.0057	1	0.541	0.17038817	5	0.03	0.5	0.34
Vanadium	25.9	0.00184	0.047656	0.0049	0.057	0.0002793	1	0.541	0.088604991	2.1	0.04	0.21	0.42
Zinc	520	0.00184	0.9568	0.07	0.057	0.00399	1	0.541	1.775951941	225	0.01	22.5	0.08

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 5. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.000687	0.0012366	0.004	0.0665	0.000266	1	0.5	0.0030052	0.62	0.005	0.062	0.048
Arsenic	82.1	0.000687	0.0564027	0.00036	0.0665	0.00002394	1	0.5	0.11285328	9.63	0.012	1.91	0.059
Barium	112	0.000687	0.076944	0.0781	0.0665	0.00519365	1	0.5	0.1642753	51	0.003	5.1	0.032
Beryllium	0.95	0.000687	0.00065265	0.000085	0.0665	5.6525E-06	1	0.5	0.001316605	6.2	0.000	0.62	0.002
Cadmium	0.75	0.000687	0.00051525	0.00037	0.0665	0.000024605	1	0.5	0.00107971	2.3	0.000	0.23	0.005
Cobalt	23.1	0.000687	0.0158697	0.0018	0.0665	0.0001197	1	0.5	0.0319788	20	0.002	5	0.006
Copper	57.5	0.000687	0.0395025	0.0084	0.0665	0.0005586	1	0.5	0.0801222	35.4	0.002	24.3	0.003
Manganese	3090	0.000687	2.12283	0.369	0.0665	0.0245385	1	0.5	4.294737	268	0.016	83	0.052
Nickel	37.1	0.000687	0.0254877	0.0035	0.0665	0.00023275	1	0.5	0.0514409	42.1	0.001	23.1	0.002
Selenium	0.65	0.000687	0.00044655	0.000065	0.0665	4.3225E-06	1	0.5	0.000901745	0.25	0.004	0.025	0.036
Silver	0.31	0.000687	0.00021297	0.0009	0.0665	0.00005985	1	0.5	0.00054564	2.7	0.000	0.27	0.002
Uranium	406	0.000687	0.278922	0.255	0.0665	0.0169575	1	0.5	0.591759	5	0.118	0.5	**1.184**
Vanadium	32.8	0.000687	0.0225336	0.00025	0.0665	0.000016625	1	0.5	0.04510045	2.1	0.021	0.21	0.215
Zinc	142	0.000687	0.097554	0.0087	0.0665	0.00057855	1	0.5	0.1962651	225	0.001	22.5	0.009

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 5. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.000576	0.0010368	0.004	0.097	0.000388	1	2.09	0.000681722	NS	N/A	NS	N/A
Arsenic	82.1	0.000576	0.0472896	0.00036	0.097	0.00003492	1	2.09	0.022643311	22.8	0.0010	5.7	0.004
Barium	112	0.000576	0.064512	0.0781	0.097	0.0075757	1	2.09	0.034491722	416.5	0.0001	208.3	0.000
Beryllium	0.95	0.000576	0.0005472	0.000085	0.097	0.000008245	1	2.09	0.000265763	NS	N/A	NS	N/A
Cadmium	0.75	0.000576	0.000432	0.00037	0.097	0.00003589	1	2.09	0.000223871	3.4	0.0001	0.85	0.000
Cobalt	23.1	0.000576	0.0133056	0.0018	0.097	0.0001746	1	2.09	0.006449856	43.9	0.0001	23.1	0.000
Copper	57.5	0.000576	0.03312	0.0084	0.097	0.0008148	1	2.09	0.016236746	33.2	0.0005	26.9	0.001
Manganese	3090	0.000576	1.77984	0.369	0.097	0.035793	1	2.09	0.868723923	9,770	0.0001	977	0.001
Nickel	37.1	0.000576	0.0213696	0.0035	0.097	0.0003395	1	2.09	0.010387129	79	0.0001	57.2	0.000
Selenium	0.65	0.000576	0.0003744	0.000065	0.097	0.000006305	1	2.09	0.000182156	0.8	0.0002	0.4	0.000
Silver	0.31	0.000576	0.00017856	0.0009	0.097	0.0000873	1	2.09	0.000127206	39.7	0.0000	3.97	0.000
Uranium	406	0.000576	0.233856	0.255	0.097	0.024735	1	2.09	0.123727751	1,600	0.0001	160	0.001
Vanadium	32.8	0.000576	0.0188928	0.00025	0.097	0.00002425	1	2.09	0.00905122	114	0.0001	11.4	0.001
Zinc	142	0.000576	0.081792	0.0087	0.097	0.0008439	1	2.09	0.039538708	224	0.0002	10.5	0.004

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 5. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.000895	0.001611	0.004	0.14	0.00056	1	3.63	0.000598072	NS	N/A	NS	N/A
Arsenic	82.1	0.000895	0.0734795	0.00036	0.14	0.0000504	1	3.63	0.020256171	22.8	0.001	5.7	0.004
Barium	112	0.000895	0.10024	0.0781	0.14	0.010934	1	3.63	0.030626446	416.5	0.000	208.3	0.000
Beryllium	0.95	0.000895	0.00085025	0.000085	0.14	0.0000119	1	3.63	0.000237507	NS	N/A	NS	N/A
Cadmium	0.75	0.000895	0.00067125	0.00037	0.14	0.0000518	1	3.63	0.000199187	3.4	0.000	0.85	0.000
Cobalt	23.1	0.000895	0.0206745	0.0018	0.14	0.000252	1	3.63	0.005764876	43.9	0.000	23.1	0.000
Copper	57.5	0.000895	0.0514625	0.0084	0.14	0.001176	1	3.63	0.014500964	33.2	0.000	26.9	0.001
Manganese	3090	0.000895	2.76555	0.369	0.14	0.05166	1	3.63	0.776090909	9,770	0.000	977	0.001
Nickel	37.1	0.000895	0.0332045	0.0035	0.14	0.00049	1	3.63	0.009282231	79	0.000	57.2	0.000
Selenium	0.65	0.000895	0.00058175	0.000065	0.14	0.0000091	1	3.63	0.000162769	0.8	0.000	0.4	0.000
Silver	0.31	0.000895	0.00027745	0.0009	0.14	0.000126	1	3.63	0.000111143	39.7	0.000	3.97	0.000
Uranium	406	0.000895	0.36337	0.255	0.14	0.0357	1	3.63	0.109936639	1,600	0.000	160	0.001
Vanadium	32.8	0.000895	0.029356	0.00025	0.14	0.000035	1	3.63	0.008096694	114	0.000	11.4	0.001
Zinc	142	0.000895	0.12709	0.0087	0.14	0.001218	1	3.63	0.035346556	224	0.000	10.5	0.003

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 5. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.0442	0.07956	0.004	0.04	0.00016	1	0.55	0.144945455	NS	N/A	NS	N/A
Arsenic	82.1	0.0442	3.62882	0.00036	0.04	0.0000144	1	0.55	6.597880727	22.8	0.29	5.7	**1.16**
Barium	112	0.0442	4.9504	0.0781	0.04	0.003124	1	0.55	9.006407273	416.5	0.02	208.3	0.04
Beryllium	0.95	0.0442	0.04199	0.000085	0.04	0.0000034	1	0.55	0.076351636	NS	N/A	NS	N/A
Cadmium	0.75	0.0442	0.03315	0.00037	0.04	0.0000148	1	0.55	0.060299636	3.4	0.02	0.85	0.07
Cobalt	23.1	0.0442	1.02102	0.0018	0.04	0.000072	1	0.55	1.856530909	43.9	0.04	23.1	0.08
Copper	57.5	0.0442	2.5415	0.0084	0.04	0.000336	1	0.55	4.62152	33.2	0.14	26.9	0.17
Manganese	3090	0.0442	136.578	0.369	0.04	0.01476	1	0.55	248.3504727	9770	0.03	977	0.25
Nickel	37.1	0.0442	1.63982	0.0035	0.04	0.00014	1	0.55	2.981745455	79	0.04	57.2	0.05
Selenium	0.65	0.0442	0.02873	0.000065	0.04	0.0000026	1	0.55	0.052241091	0.8	0.07	0.4	0.13
Silver	0.31	0.0442	0.013702	0.0009	0.04	0.000036	1	0.55	0.024978182	39.7	0.00	3.97	0.01
Uranium	406	0.0442	17.9452	0.255	0.04	0.0102	1	0.55	32.64618182	1,600	0.02	160	0.20
Vanadium	32.8	0.0442	1.44976	0.00025	0.04	0.00001	1	0.55	2.635945455	114	0.02	11.4	0.23
Zinc	142	0.0442	6.2764	0.0087	0.04	0.000348	1	0.55	11.41226909	224	0.05	10.5	**1.09**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 5. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.00827	0.014886	0.004	0.0099	0.0000396	1	0.07	0.213222857	NS	N/A	NS	N/A
Arsenic	82.1	0.00827	0.678967	0.00036	0.0099	0.000003564	1	0.07	9.699579486	22.8	0.43	5.7	**1.70**
Barium	112	0.00827	0.92624	0.0781	0.0099	0.00077319	1	0.07	13.24304557	416.5	0.03	208.3	0.06
Beryllium	0.95	0.00827	0.0078565	0.000085	0.0099	8.415E-07	1	0.07	0.112247736	NS	N/A	NS	N/A
Cadmium	0.75	0.00827	0.0062025	0.00037	0.0099	0.000003663	1	0.07	0.088659471	3.4	0.03	0.85	0.10
Cobalt	23.1	0.00827	0.191037	0.0018	0.0099	0.00001782	1	0.07	2.729354571	43.9	0.06	23.1	0.12
Copper	57.5	0.00827	0.475525	0.0084	0.0099	0.00008316	1	0.07	6.794402286	33.2	0.20	26.9	0.25
Iron	33800	0.00827	279.526	0.122	0.0099	0.0012078	1	0.07	3993.245826	NS	N/A	NS	N/A
Manganese	3090	0.00827	25.5543	0.369	0.0099	0.0036531	1	0.07	365.1136157	9770	0.04	977	0.37
Nickel	37.1	0.00827	0.306817	0.0035	0.0099	0.00003465	1	0.07	4.383595	79	0.06	57.2	0.08
Selenium	0.65	0.00827	0.0053755	0.000065	0.0099	6.435E-07	1	0.07	0.07680205	0.8	0.10	0.4	0.19
Silver	0.31	0.00827	0.0025637	0.0009	0.0099	0.00000891	1	0.07	0.036751571	39.7	0.00	3.97	0.01
Uranium	406	0.00827	3.35762	0.255	0.0099	0.0025245	1	0.07	48.00206429	1,600	0.03	160	0.30
Vanadium	32.8	0.00827	0.271256	0.00025	0.0099	0.000002475	1	0.07	3.875121071	114	0.03	11.4	0.34
Zinc	142	0.00827	1.17434	0.0087	0.0099	0.00008613	1	0.07	16.77751614	224	0.08	10.5	**1.60**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 5. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.0143	0.02574	0.004	0.201	0.000804	1	2.2	0.012065455	0.62	0.02	0.062	0.19
Arsenic	82.1	0.0143	1.17403	0.00036	0.201	0.00007236	1	2.2	0.533682891	9.63	0.06	1.91	0.28
Barium	112	0.0143	1.6016	0.0781	0.201	0.0156981	1	2.2	0.7351355	51	0.01	5.1	0.14
Beryllium	0.95	0.0143	0.013585	0.000085	0.201	0.000017085	1	2.2	0.006182766	6.2	0.00	0.62	0.01
Cadmium	0.75	0.0143	0.010725	0.00037	0.201	0.00007437	1	2.2	0.004908805	2.3	0.00	0.23	0.02
Cobalt	23.1	0.0143	0.33033	0.0018	0.201	0.0003618	1	2.2	0.150314455	20	0.01	5	0.03
Copper	57.5	0.0143	0.82225	0.0084	0.201	0.0016884	1	2.2	0.374517455	35.4	0.01	24.3	0.02
Manganese	3090	0.0143	44.187	0.369	0.201	0.074169	1	2.2	20.11871318	268	0.08	83	0.24
Nickel	37.1	0.0143	0.53053	0.0035	0.201	0.0007035	1	2.2	0.241469773	42.1	0.01	23.1	0.01
Selenium	0.65	0.0143	0.009295	0.000065	0.201	0.000013065	1	2.2	0.004230939	0.25	0.02	0.025	0.17
Silver	0.31	0.0143	0.004433	0.0009	0.201	0.0001809	1	2.2	0.002097227	2.7	0.00	0.27	0.01
Uranium	406	0.0143	5.8058	0.255	0.201	0.051255	1	2.2	2.662297727	5	0.53	0.5	**5.32**
Vanadium	32.8	0.0143	0.46904	0.00025	0.201	0.00005025	1	2.2	0.213222841	2.1	0.10	0.21	**1.02**
Zinc	142	0.0143	2.0306	0.0087	0.201	0.0017487	1	2.2	0.923794864	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 3. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pollution Control Pond, Instream Sediment
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000687	0.00044655	0.0025	0.0665	0.00016625	1	0.5	0.0012256	0.62	0.002	0.062	0.020
Arsenic	26.5	0.000687	0.0182055	0.0175	0.0665	0.00116375	1	0.5	0.0387385	9.63	0.004	1.91	0.020
Barium	689	0.000687	0.473343	0.0121	0.0665	0.00080465	1	0.5	0.9482953	51	0.019	5.1	0.186
Beryllium	29.8	0.000687	0.0204726	0.06	0.0665	0.00399	1	0.5	0.0489252	6.2	0.008	0.62	0.079
Cadmium	11.2	0.000687	0.0076944	0.07	0.0665	0.004655	1	0.5	0.0246988	2.3	0.011	0.23	0.107
Cobalt	166	0.000687	0.114042	1.33	0.0665	0.088445	1	0.5	0.404974	20	0.020	5	0.081
Copper	751	0.000687	0.515937	0.384	0.0665	0.025536	1	0.5	1.082946	35.4	0.031	24.3	0.045
Manganese	4330	0.000687	2.97471	142	0.0665	9.443	1	0.5	24.83542	268	0.093	83	0.299
Nickel	757	0.000687	0.520059	2.76	0.0665	0.18354	1	0.5	1.407198	42.1	0.033	23.1	0.061
Selenium	0.5	0.000687	0.0003435	0.0717	0.0665	0.00476805	1	0.5	0.0102231	0.25	0.041	0.025	0.409
Silver	0.26	0.000687	0.00017862	0.005	0.0665	0.0003325	1	0.5	0.00102224	2.7	0.000	0.27	0.004
Uranium	5780	0.000687	3.97086	30	0.0665	1.995	1	0.5	11.93172	5	**2.386**	0.5	**23.863**
Vanadium	16.3	0.000687	0.0111981	0.0005	0.0665	0.00003325	1	0.5	0.0224627	2.1	0.011	0.21	0.107
Zinc	995	0.000687	0.683565	6	0.0665	0.399	1	0.5	2.16513	225	0.010	22.5	0.096

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 3. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097		1	2.09					
Antimony	0.65	0.000576	0.0003744	0.0025	0.097	0.0002425	1	2.09	0.000295167	NS	N/A	NS	N/A
Arsenic	26.5	0.000576	0.015264	0.0175	0.097	0.0016975	1	2.09	0.00811555	22.8	0.0004	5.7	0.001
Barium	689	0.000576	0.396864	0.0121	0.097	0.0011737	1	2.09	0.19044866	416.5	0.0005	208.3	0.001
Beryllium	29.8	0.000576	0.0171648	0.06	0.097	0.00582	1	2.09	0.010997512	NS	N/A	NS	N/A
Cadmium	11.2	0.000576	0.0064512	0.07	0.097	0.00679	1	2.09	0.006335502	3.4	0.0019	0.85	0.007
Cobalt	166	0.000576	0.095616	1.33	0.097	0.12901	1	2.09	0.107476555	43.9	0.0024	23.1	0.005
Copper	751	0.000576	0.432576	0.384	0.097	0.037248	1	2.09	0.224796172	33.2	0.0068	26.9	0.008
Manganese	4330	0.000576	2.49408	142	0.097	13.774	1	2.09	7.783770335	9,770	0.0008	977	0.008
Nickel	757	0.000576	0.436032	2.76	0.097	0.26772	1	2.09	0.336723445	79	0.0043	57.2	0.006
Selenium	0.5	0.000576	0.000288	0.0717	0.097	0.0069549	1	2.09	0.003465502	0.8	0.0043	0.4	0.009
Silver	0.26	0.000576	0.00014976	0.005	0.097	0.000485	1	2.09	0.000303713	39.7	0.0000	3.97	0.000
Uranium	5780	0.000576	3.32928	30	0.097	2.91	1	2.09	2.985301435	1,600	0.0019	160	0.019
Vanadium	16.3	0.000576	0.0093888	0.0005	0.097	0.0000485	1	2.09	0.004515455	114	0.0000	11.4	0.000
Zinc	995	0.000576	0.57312	6	0.097	0.582	1	2.09	0.552688995	224	0.0025	10.5	0.053

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 3. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000895	0.00058175	0.0025	0.14	0.00035	1	3.63	0.00025668	NS	N/A	NS	N/A
Arsenic	26.5	0.000895	0.0237175	0.0175	0.14	0.00245	1	3.63	0.007208678	22.8	0.000	5.7	0.001
Barium	689	0.000895	0.616655	0.0121	0.14	0.001694	1	3.63	0.170344077	416.5	0.000	208.3	0.001
Beryllium	29.8	0.000895	0.026671	0.06	0.14	0.0084	1	3.63	0.009661433	NS	N/A	NS	N/A
Cadmium	11.2	0.000895	0.010024	0.07	0.14	0.0098	1	3.63	0.005461157	3.4	0.002	0.85	0.006
Cobalt	166	0.000895	0.14857	1.33	0.14	0.1862	1	3.63	0.09222314	43.9	0.002	23.1	0.004
Copper	751	0.000895	0.672145	0.384	0.14	0.05376	1	3.63	0.199973829	33.2	0.006	26.9	0.007
Manganese	4330	0.000895	3.87535	142	0.14	19.88	1	3.63	6.544173554	9,770	0.001	977	0.007
Nickel	757	0.000895	0.677515	2.76	0.14	0.3864	1	3.63	0.293089532	79	0.004	57.2	0.005
Selenium	0.5	0.000895	0.0004475	0.0717	0.14	0.010038	1	3.63	0.002888567	0.8	0.004	0.4	0.007
Silver	0.26	0.000895	0.0002327	0.005	0.14	0.0007	1	3.63	0.000256942	39.7	0.000	3.97	0.000
Uranium	5780	0.000895	5.1731	30	0.14	4.2	1	3.63	2.582121212	1,600	0.002	160	0.016
Vanadium	16.3	0.000895	0.0145885	0.0005	0.14	0.00007	1	3.63	0.004038154	114	0.000	11.4	0.000
Zinc	995	0.000895	0.890525	6	0.14	0.84	1	3.63	0.47672865	224	0.002	10.5	0.045

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
N/A:	Value could not be calculated with the information available

TABLE PK 3. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0442	0.02873	0.0025	0.04	0.0001	1	0.55	0.052418182	NS	N/A	NS	N/A
Arsenic	26.5	0.0442	1.1713	0.0175	0.04	0.0007	1	0.55	2.130909091	22.8	0.09	5.7	0.37
Barium	689	0.0442	30.4538	0.0121	0.04	0.000484	1	0.55	55.37142545	416.5	0.13	208.3	0.27
Beryllium	29.8	0.0442	1.31716	0.06	0.04	0.0024	1	0.55	2.3992	NS	N/A	NS	N/A
Cadmium	11.2	0.0442	0.49504	0.07	0.04	0.0028	1	0.55	0.905163636	3.4	0.27	0.85	**1.06**
Cobalt	166	0.0442	7.3372	1.33	0.04	0.0532	1	0.55	13.43709091	43.9	0.31	23.1	0.58
Copper	751	0.0442	33.1942	0.384	0.04	0.01536	1	0.55	60.38101818	33.2	**1.82**	26.9	**2.24**
Manganese	4330	0.0442	191.386	142	0.04	5.68	1	0.55	358.3018182	9770	0.04	977	0.37
Nickel	757	0.0442	33.4594	2.76	0.04	0.1104	1	0.55	61.036	79	0.77	57.2	**1.07**
Selenium	0.5	0.0442	0.0221	0.0717	0.04	0.002868	1	0.55	0.045396364	0.8	0.06	0.4	0.11
Silver	0.26	0.0442	0.011492	0.005	0.04	0.0002	1	0.55	0.021258182	39.7	0.00	3.97	0.01
Uranium	5780	0.0442	255.476	30	0.04	1.2	1	0.55	466.6836364	1,600	0.29	160	**2.92**
Vanadium	16.3	0.0442	0.72046	0.0005	0.04	0.00002	1	0.55	1.309963636	114	0.01	11.4	0.11
Zinc	995	0.0442	43.979	6	0.04	0.24	1	0.55	80.39818182	224	0.36	10.5	**7.66**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 3. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00827			0.0099		1	0.07					
Antimony	0.65	0.00827	0.0053755	0.0025	0.0099	0.00002475	1	0.07	0.077146429	NS	N/A	NS	N/A
Arsenic	26.5	0.00827	0.219155	0.0175	0.0099	0.00017325	1	0.07	3.133260714	22.8	0.14	5.7	0.55
Barium	689	0.00827	5.69803	0.0121	0.0099	0.00011979	1	0.07	81.40213986	416.5	0.20	208.3	0.39
Beryllium	29.8	0.00827	0.246446	0.06	0.0099	0.000594	1	0.07	3.529142857	NS	N/A	NS	N/A
Cadmium	11.2	0.00827	0.092624	0.07	0.0099	0.000693	1	0.07	1.3331	3.4	0.39	0.85	**1.57**
Cobalt	166	0.00827	1.37282	1.33	0.0099	0.013167	1	0.07	19.79981429	43.9	0.45	23.1	0.86
Copper	751	0.00827	6.21077	0.384	0.0099	0.0038016	1	0.07	88.77959429	33.2	**2.67**	26.9	**3.30**
Manganese	4330	0.00827	35.8091	142	0.0099	1.4058	1	0.07	531.6414286	9770	0.05	977	0.54
Nickel	757	0.00827	6.26039	2.76	0.0099	0.027324	1	0.07	89.82448571	79	**1.14**	57.2	**1.57**
Selenium	0.5	0.00827	0.004135	0.0717	0.0099	0.00070983	1	0.07	0.069211857	0.8	0.09	0.4	0.17
Silver	0.26	0.00827	0.0021502	0.005	0.0099	0.0000495	1	0.07	0.031424286	39.7	0.00	3.97	0.01
Uranium	5780	0.00827	47.8006	30	0.0099	0.297	1	0.07	687.1085714	1,600	0.43	160	**4.29**
Vanadium	16.3	0.00827	0.134801	0.0005	0.0099	0.00000495	1	0.07	1.925799286	114	0.02	11.4	0.17
Zinc	995	0.00827	8.22865	6	0.0099	0.0594	1	0.07	118.4007143	224	0.53	10.5	**11.28**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 3. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0143	0.009295	0.0025	0.201	0.0005025	1	2.2	0.004453409	0.62	0.01	0.062	0.07
Arsenic	26.5	0.0143	0.37895	0.0175	0.201	0.0035175	1	2.2	0.173848864	9.63	0.02	1.91	0.09
Barium	689	0.0143	9.8527	0.0121	0.201	0.0024321	1	2.2	4.4796055	51	0.09	5.1	0.88
Beryllium	29.8	0.0143	0.42614	0.06	0.201	0.01206	1	2.2	0.199181818	6.2	0.03	0.62	0.32
Cadmium	11.2	0.0143	0.16016	0.07	0.201	0.01407	1	2.2	0.079195455	2.3	0.03	0.23	0.34
Cobalt	166	0.0143	2.3738	1.33	0.201	0.26733	1	2.2	1.200513636	20	0.06	5	0.24
Copper	751	0.0143	10.7393	0.384	0.201	0.077184	1	2.2	4.916583636	35.4	0.14	24.3	0.20
Manganese	4330	0.0143	61.919	142	0.201	28.542	1	2.2	41.11863636	268	0.15	83	0.50
Nickel	757	0.0143	10.8251	2.76	0.201	0.55476	1	2.2	5.172663636	42.1	0.12	23.1	0.22
Selenium	0.5	0.0143	0.00715	0.0717	0.201	0.0144117	1	2.2	0.009800773	0.25	0.04	0.025	0.39
Silver	0.26	0.0143	0.003718	0.005	0.201	0.001005	1	2.2	0.002146818	2.7	0.00	0.27	0.01
Uranium	5780	0.0143	82.654	30	0.201	6.03	1	2.2	40.31090909	5	**8.06**	0.5	**80.62**
Vanadium	16.3	0.0143	0.23309	0.0005	0.201	0.0001005	1	2.2	0.105995682	2.1	0.05	0.21	0.50
Zinc	995	0.0143	14.2285	6	0.201	1.206	1	2.2	7.015681818	225	0.03	22.5	0.31

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 1. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.000687	0.00051525	0.002	0.0665	0.000133	1	0.5	0.0012965	0.62	0.002	0.062	0.021
Arsenic	54.7	0.000687	0.0375789	0.0163	0.0665	0.00108395	1	0.5	0.0773257	9.63	0.008	1.91	0.040
Barium	516	0.000687	0.354492	0.0482	0.0665	0.0032053	1	0.5	0.7153946	51	0.014	5.1	0.140
Beryllium	7	0.000687	0.004809	0.05	0.0665	0.003325	1	0.5	0.016268	6.2	0.003	0.62	0.026
Cadmium	0.155	0.000687	0.000106485	0.07	0.0665	0.004655	1	0.5	0.00952297	2.3	0.004	0.23	0.041
Cobalt	62.1	0.000687	0.0426627	1.1	0.0665	0.07315	1	0.5	0.2316254	20	0.012	5	0.046
Copper	102	0.000687	0.070074	0.286	0.0665	0.019019	1	0.5	0.178186	35.4	0.005	24.3	0.007
Manganese	1350	0.000687	0.92745	120	0.0665	7.98	1	0.5	17.8149	268	0.066	83	0.215
Nickel	87.6	0.000687	0.0601812	2.43	0.0665	0.161595	1	0.5	0.4435524	42.1	0.011	23.1	0.019
Selenium	0.6	0.000687	0.0004122	0.0653	0.0665	0.00434245	1	0.5	0.0095093	0.25	0.038	0.025	0.380
Silver	0.3	0.000687	0.0002061	0.06	0.0665	0.00399	1	0.5	0.0083922	2.7	0.003	0.27	0.031
Uranium	917	0.000687	0.629979	24	0.0665	1.596	1	0.5	4.451958	5	0.890	0.5	**8.904**
Vanadium	41.2	0.000687	0.0283044	0.0005	0.0665	0.00003325	1	0.5	0.0566753	2.1	0.027	0.21	0.270
Zinc	315	0.000687	0.216405	5.48	0.0665	0.36442	1	0.5	1.16165	225	0.005	22.5	0.052

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 1. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.000576	0.000432	0.002	0.097	0.000194	1	2.09	0.000299522	NS	N/A	NS	N/A
Arsenic	54.7	0.000576	0.0315072	0.0163	0.097	0.0015811	1	2.09	0.015831722	22.8	0.0007	5.7	0.003
Barium	516	0.000576	0.297216	0.0482	0.097	0.0046754	1	2.09	0.144445646	416.5	0.0003	208.3	0.001
Beryllium	7	0.000576	0.004032	0.05	0.097	0.00485	1	2.09	0.004249761	NS	N/A	NS	N/A
Cadmium	0.155	0.000576	0.00008928	0.07	0.097	0.00679	1	2.09	0.003291522	3.4	0.0010	0.85	0.004
Cobalt	62.1	0.000576	0.0357696	1.1	0.097	0.1067	1	2.09	0.068167273	43.9	0.0016	23.1	0.003
Copper	102	0.000576	0.058752	0.286	0.097	0.027742	1	2.09	0.041384689	33.2	0.0012	26.9	0.002
Manganese	1350	0.000576	0.7776	120	0.097	11.64	1	2.09	5.941435407	9,770	0.0006	977	0.006
Nickel	87.6	0.000576	0.0504576	2.43	0.097	0.23571	1	2.09	0.136922297	79	0.0017	57.2	0.002
Selenium	0.6	0.000576	0.0003456	0.0653	0.097	0.0063341	1	2.09	0.003196029	0.8	0.0040	0.4	0.008
Silver	0.3	0.000576	0.0001728	0.06	0.097	0.00582	1	2.09	0.002867368	39.7	0.0001	3.97	0.001
Uranium	917	0.000576	0.528192	24	0.097	2.328	1	2.09	1.366599043	1,600	0.0009	160	0.009
Vanadium	41.2	0.000576	0.0237312	0.0005	0.097	0.0000485	1	2.09	0.011377847	114	0.0001	11.4	0.001
Zinc	315	0.000576	0.18144	5.48	0.097	0.53156	1	2.09	0.341148325	224	0.0015	10.5	0.032

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 1. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.000895	0.00067125	0.002	0.14	0.00028	1	3.63	0.000262052	NS	N/A	NS	N/A
Arsenic	54.7	0.000895	0.0489565	0.0163	0.14	0.002282	1	3.63	0.014115289	22.8	0.001	5.7	0.002
Barium	516	0.000895	0.46182	0.0482	0.14	0.006748	1	3.63	0.129082094	416.5	0.000	208.3	0.001
Beryllium	7	0.000895	0.006265	0.05	0.14	0.007	1	3.63	0.00365427	NS	N/A	NS	N/A
Cadmium	0.155	0.000895	0.000138725	0.07	0.14	0.0098	1	3.63	0.002737941	3.4	0.001	0.85	0.003
Cobalt	62.1	0.000895	0.0555795	1.1	0.14	0.154	1	3.63	0.057735399	43.9	0.001	23.1	0.002
Copper	102	0.000895	0.09129	0.286	0.14	0.04004	1	3.63	0.036179063	33.2	0.001	26.9	0.001
Manganese	1350	0.000895	1.20825	120	0.14	16.8	1	3.63	4.960950413	9,770	0.001	977	0.005
Nickel	87.6	0.000895	0.078402	2.43	0.14	0.3402	1	3.63	0.115317355	79	0.001	57.2	0.002
Selenium	0.6	0.000895	0.000537	0.0653	0.14	0.009142	1	3.63	0.002666391	0.8	0.003	0.4	0.007
Silver	0.3	0.000895	0.0002685	0.06	0.14	0.0084	1	3.63	0.002388017	39.7	0.000	3.97	0.001
Uranium	917	0.000895	0.820715	24	0.14	3.36	1	3.63	1.151712121	1,600	0.001	160	0.007
Vanadium	41.2	0.000895	0.036874	0.0005	0.14	0.00007	1	3.63	0.01017741	114	0.000	11.4	0.001
Zinc	315	0.000895	0.281925	5.48	0.14	0.7672	1	3.63	0.289015152	224	0.001	10.5	0.028

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 1. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.0442	0.03315	0.002	0.04	0.00008	1	0.55	0.060418182	NS	N/A	NS	N/A
Arsenic	54.7	0.0442	2.41774	0.0163	0.04	0.000652	1	0.55	4.397076364	22.8	0.19	5.7	0.77
Barium	516	0.0442	22.8072	0.0482	0.04	0.001928	1	0.55	41.47114182	416.5	0.10	208.3	0.20
Beryllium	7	0.0442	0.3094	0.05	0.04	0.002	1	0.55	0.566181818	NS	N/A	NS	N/A
Cadmium	0.155	0.0442	0.006851	0.07	0.04	0.0028	1	0.55	0.017547273	3.4	0.01	0.85	0.02
Cobalt	62.1	0.0442	2.74482	1.1	0.04	0.044	1	0.55	5.070581818	43.9	0.12	23.1	0.22
Copper	102	0.0442	4.5084	0.286	0.04	0.01144	1	0.55	8.217890909	33.2	0.25	26.9	0.31
Manganese	1350	0.0442	59.67	120	0.04	4.8	1	0.55	117.2181818	9770	0.01	977	0.12
Nickel	87.6	0.0442	3.87192	2.43	0.04	0.0972	1	0.55	7.216581818	79	0.09	57.2	0.13
Selenium	0.6	0.0442	0.02652	0.0653	0.04	0.002612	1	0.55	0.052967273	0.8	0.07	0.4	0.13
Silver	0.3	0.0442	0.01326	0.06	0.04	0.0024	1	0.55	0.028472727	39.7	0.00	3.97	0.01
Uranium	917	0.0442	40.5314	24	0.04	0.96	1	0.55	75.43890909	1,600	0.05	160	0.47
Vanadium	41.2	0.0442	1.82104	0.0005	0.04	0.00002	1	0.55	3.311018182	114	0.03	11.4	0.29
Zinc	315	0.0442	13.923	5.48	0.04	0.2192	1	0.55	25.71309091	224	0.12	10.5	**2.45**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 1. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 3,Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.00827	0.0062025	0.002	0.0099	0.0000198	1	0.07	0.08889	NS	N/A	NS	N/A
Arsenic	54.7	0.00827	0.452369	0.0163	0.0099	0.00016137	1	0.07	6.464719571	22.8	0.28	5.7	**1.13**
Barium	516	0.00827	4.26732	0.0482	0.0099	0.00047718	1	0.07	60.96853114	416.5	0.15	208.3	0.29
Beryllium	7	0.00827	0.05789	0.05	0.0099	0.000495	1	0.07	0.834071429	NS	N/A	NS	N/A
Cadmium	0.155	0.00827	0.00128185	0.07	0.0099	0.000693	1	0.07	0.028212143	3.4	0.01	0.85	0.03
Cobalt	62.1	0.00827	0.513567	1.1	0.0099	0.01089	1	0.07	7.492242857	43.9	0.17	23.1	0.32
Copper	102	0.00827	0.84354	0.286	0.0099	0.0028314	1	0.07	12.09102	33.2	0.36	26.9	0.45
Manganese	1350	0.00827	11.1645	120	0.0099	1.188	1	0.07	176.4642857	9770	0.02	977	0.18
Nickel	87.6	0.00827	0.724452	2.43	0.0099	0.024057	1	0.07	10.69298571	79	0.14	57.2	0.19
Selenium	0.6	0.00827	0.004962	0.0653	0.0099	0.00064647	1	0.07	0.080121	0.8	0.10	0.4	0.20
Silver	0.3	0.00827	0.002481	0.06	0.0099	0.000594	1	0.07	0.043928571	39.7	0.00	3.97	0.01
Uranium	917	0.00827	7.58359	24	0.0099	0.2376	1	0.07	111.7312857	1,600	0.07	160	0.70
Vanadium	41.2	0.00827	0.340724	0.0005	0.0099	0.00000495	1	0.07	4.867556429	114	0.04	11.4	0.43
Zinc	315	0.00827	2.60505	5.48	0.0099	0.054252	1	0.07	37.99002857	224	0.17	10.5	**3.62**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 1. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.0143	0.010725	0.002	0.201	0.000402	1	2.2	0.005057727	0.62	0.01	0.062	0.08
Arsenic	54.7	0.0143	0.78221	0.0163	0.201	0.0032763	1	2.2	0.357039227	9.63	0.04	1.91	0.19
Barium	516	0.0143	7.3788	0.0482	0.201	0.0096882	1	2.2	3.358403727	51	0.07	5.1	0.66
Beryllium	7	0.0143	0.1001	0.05	0.201	0.01005	1	2.2	0.050068182	6.2	0.01	0.62	0.08
Cadmium	0.155	0.0143	0.0022165	0.07	0.201	0.01407	1	2.2	0.007402955	2.3	0.00	0.23	0.03
Cobalt	62.1	0.0143	0.88803	1.1	0.201	0.2211	1	2.2	0.50415	20	0.03	5	0.10
Copper	102	0.0143	1.4586	0.286	0.201	0.057486	1	2.2	0.68913	35.4	0.02	24.3	0.03
Manganese	1350	0.0143	19.305	120	0.201	24.12	1	2.2	19.73863636	268	0.07	83	0.24
Nickel	87.6	0.0143	1.25268	2.43	0.201	0.48843	1	2.2	0.791413636	42.1	0.02	23.1	0.03
Selenium	0.6	0.0143	0.00858	0.0653	0.201	0.0131253	1	2.2	0.009866045	0.25	0.04	0.025	0.39
Silver	0.3	0.0143	0.00429	0.06	0.201	0.01206	1	2.2	0.007431818	2.7	0.00	0.27	0.03
Uranium	917	0.0143	13.1131	24	0.201	4.824	1	2.2	8.153227273	5	**1.63**	0.5	**16.31**
Vanadium	41.2	0.0143	0.58916	0.0005	0.201	0.0001005	1	2.2	0.267845682	2.1	0.13	0.21	**1.28**
Zinc	315	0.0143	4.5045	5.48	0.201	1.10148	1	2.2	2.548172727	225	0.01	22.5	0.11

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 2. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000687	0.0004122	0.0025	0.0665	0.00016625	1	0.5	0.0011569	0.62	0.002	0.062	0.019
Arsenic	25.4	0.000687	0.0174498	0.001	0.0665	0.0000665	1	0.5	0.0350326	9.63	0.004	1.91	0.018
Barium	131	0.000687	0.089997	0.008	0.0665	0.000532	1	0.5	0.181058	51	0.004	5.1	0.036
Beryllium	3.6	0.000687	0.0024732	0.014	0.0665	0.000931	1	0.5	0.0068084	6.2	0.001	0.62	0.011
Cadmium	0.115	0.000687	0.000079005	0.0002	0.0665	0.0000133	1	0.5	0.00018461	2.3	0.000	0.23	0.001
Cobalt	23.1	0.000687	0.0158697	0.0025	0.0665	0.00016625	1	0.5	0.0320719	20	0.002	5	0.006
Copper	26.7	0.000687	0.0183429	0.0231	0.0665	0.00153615	1	0.5	0.0397581	35.4	0.001	24.3	0.002
Manganese	1820	0.000687	1.25034	0.88	0.0665	0.05852	1	0.5	2.61772	268	0.010	83	0.032
Nickel	38.6	0.000687	0.0265182	0.66	0.0665	0.04389	1	0.5	0.1408164	42.1	0.003	23.1	0.006
Selenium	0.47	0.000687	0.00032289	0.003	0.0665	0.0001995	1	0.5	0.00104478	0.25	0.004	0.025	0.042
Silver	0.235	0.000687	0.000161445	0.01	0.0665	0.000665	1	0.5	0.00165289	2.7	0.001	0.27	0.006
Uranium	772	0.000687	0.530364	3.3	0.0665	0.21945	1	0.5	1.499628	5	0.300	0.5	**2.999**
Vanadium	46.1	0.000687	0.0316707	0.0005	0.0665	0.00003325	1	0.5	0.0634079	2.1	0.030	0.21	0.302
Zinc	79.8	0.000687	0.0548226	0.06	0.0665	0.00399	1	0.5	0.1176252	225	0.001	22.5	0.005

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 2. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000576	0.0003456	0.0025	0.097	0.0002425	1	2.09	0.000281388	NS	N/A	NS	N/A
Arsenic	25.4	0.000576	0.0146304	0.001	0.097	0.000097	1	2.09	0.007046603	22.8	0.0003	5.7	0.001
Barium	131	0.000576	0.075456	0.008	0.097	0.000776	1	2.09	0.036474641	416.5	0.0001	208.3	0.000
Beryllium	3.6	0.000576	0.0020736	0.014	0.097	0.001358	1	2.09	0.001641914	NS	N/A	NS	N/A
Cadmium	0.115	0.000576	0.00006624	0.0002	0.097	0.0000194	1	2.09	4.09761E-05	3.4	0.0000	0.85	0.000
Cobalt	23.1	0.000576	0.0133056	0.0025	0.097	0.0002425	1	2.09	0.006482344	43.9	0.0001	23.1	0.000
Copper	26.7	0.000576	0.0153792	0.0231	0.097	0.0022407	1	2.09	0.008430574	33.2	0.0003	26.9	0.000
Manganese	1820	0.000576	1.04832	0.88	0.097	0.08536	1	2.09	0.542430622	9,770	0.0001	977	0.001
Nickel	38.6	0.000576	0.0222336	0.66	0.097	0.06402	1	2.09	0.041269665	79	0.0005	57.2	0.001
Selenium	0.47	0.000576	0.00027072	0.003	0.097	0.000291	1	2.09	0.000268766	0.8	0.0003	0.4	0.001
Silver	0.235	0.000576	0.00013536	0.01	0.097	0.00097	1	2.09	0.00052888	39.7	0.0000	3.97	0.000
Uranium	772	0.000576	0.444672	3.3	0.097	0.3201	1	2.09	0.365919617	1,600	0.0002	160	0.002
Vanadium	46.1	0.000576	0.0265536	0.0005	0.097	0.0000485	1	2.09	0.012728278	114	0.0001	11.4	0.001
Zinc	79.8	0.000576	0.0459648	0.06	0.097	0.00582	1	2.09	0.024777416	224	0.0001	10.5	0.002

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 2. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000895	0.000537	0.0025	0.14	0.00035	1	3.63	0.000244353	NS	N/A	NS	N/A
Arsenic	25.4	0.000895	0.022733	0.001	0.14	0.00014	1	3.63	0.006301102	22.8	0.000	5.7	0.001
Barium	131	0.000895	0.117245	0.008	0.14	0.00112	1	3.63	0.032607438	416.5	0.000	208.3	0.000
Beryllium	3.6	0.000895	0.003222	0.014	0.14	0.00196	1	3.63	0.001427548	NS	N/A	NS	N/A
Cadmium	0.115	0.000895	0.000102925	0.0002	0.14	0.000028	1	3.63	3.60675E-05	3.4	0.000	0.85	0.000
Cobalt	23.1	0.000895	0.0206745	0.0025	0.14	0.00035	1	3.63	0.005791873	43.9	0.000	23.1	0.000
Copper	26.7	0.000895	0.0238965	0.0231	0.14	0.003234	1	3.63	0.007473967	33.2	0.000	26.9	0.000
Manganese	1820	0.000895	1.6289	0.88	0.14	0.1232	1	3.63	0.482672176	9,770	0.000	977	0.000
Nickel	38.6	0.000895	0.034547	0.66	0.14	0.0924	1	3.63	0.034971625	79	0.000	57.2	0.001
Selenium	0.47	0.000895	0.00042065	0.003	0.14	0.00042	1	3.63	0.000231584	0.8	0.000	0.4	0.001
Silver	0.235	0.000895	0.000210325	0.01	0.14	0.0014	1	3.63	0.000443616	39.7	0.000	3.97	0.000
Uranium	772	0.000895	0.69094	3.3	0.14	0.462	1	3.63	0.317614325	1,600	0.000	160	0.002
Vanadium	46.1	0.000895	0.0412595	0.0005	0.14	0.00007	1	3.63	0.011385537	114	0.000	11.4	0.001
Zinc	79.8	0.000895	0.071421	0.06	0.14	0.0084	1	3.63	0.021989256	224	0.000	10.5	0.002

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 2. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0442	0.02652	0.0025	0.04	0.0001	1	0.55	0.0484	NS	N/A	NS	N/A
Arsenic	25.4	0.0442	1.12268	0.001	0.04	0.00004	1	0.55	2.041309091	22.8	0.09	5.7	0.36
Barium	131	0.0442	5.7902	0.008	0.04	0.00032	1	0.55	10.52821818	416.5	0.03	208.3	0.05
Beryllium	3.6	0.0442	0.15912	0.014	0.04	0.00056	1	0.55	0.290327273	NS	N/A	NS	N/A
Cadmium	0.115	0.0442	0.005083	0.0002	0.04	0.000008	1	0.55	0.009256364	3.4	0.00	0.85	0.01
Cobalt	23.1	0.0442	1.02102	0.0025	0.04	0.0001	1	0.55	1.856581818	43.9	0.04	23.1	0.08
Copper	26.7	0.0442	1.18014	0.0231	0.04	0.000924	1	0.55	2.147389091	33.2	0.06	26.9	0.08
Manganese	1820	0.0442	80.444	0.88	0.04	0.0352	1	0.55	146.3258182	9770	0.01	977	0.15
Nickel	38.6	0.0442	1.70612	0.66	0.04	0.0264	1	0.55	3.150036364	79	0.04	57.2	0.06
Selenium	0.47	0.0442	0.020774	0.003	0.04	0.00012	1	0.55	0.037989091	0.8	0.05	0.4	0.09
Silver	0.235	0.0442	0.010387	0.01	0.04	0.0004	1	0.55	0.019612727	39.7	0.00	3.97	0.00
Uranium	772	0.0442	34.1224	3.3	0.04	0.132	1	0.55	62.28072727	1,600	0.04	160	0.39
Vanadium	46.1	0.0442	2.03762	0.0005	0.04	0.00002	1	0.55	3.7048	114	0.03	11.4	0.32
Zinc	79.8	0.0442	3.52716	0.06	0.04	0.0024	1	0.55	6.417381818	224	0.03	10.5	0.61

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
N/A:	Value could not be calculated with the information available

TABLE PN 2. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00827	0.004962	0.0025	0.0099	0.00002475	1	0.07	0.071239286	NS	N/A	NS	N/A
Arsenic	25.4	0.00827	0.210058	0.001	0.0099	0.0000099	1	0.07	3.00097	22.8	0.13	5.7	0.53
Barium	131	0.00827	1.08337	0.008	0.0099	0.0000792	1	0.07	15.47784571	416.5	0.04	208.3	0.07
Beryllium	3.6	0.00827	0.029772	0.014	0.0099	0.0001386	1	0.07	0.427294286	NS	N/A	NS	N/A
Cadmium	0.115	0.00827	0.00095105	0.0002	0.0099	0.00000198	1	0.07	0.013614714	3.4	0.00	0.85	0.02
Cobalt	23.1	0.00827	0.191037	0.0025	0.0099	0.00002475	1	0.07	2.729453571	43.9	0.06	23.1	0.12
Copper	26.7	0.00827	0.220809	0.0231	0.0099	0.00022869	1	0.07	3.157681286	33.2	0.10	26.9	0.12
Manganese	1820	0.00827	15.0514	0.88	0.0099	0.008712	1	0.07	215.1444571	9770	0.02	977	0.22
Nickel	38.6	0.00827	0.319222	0.66	0.0099	0.006534	1	0.07	4.653657143	79	0.06	57.2	0.08
Selenium	0.47	0.00827	0.0038869	0.003	0.0099	0.0000297	1	0.07	0.055951429	0.8	0.07	0.4	0.14
Silver	0.235	0.00827	0.00194345	0.01	0.0099	0.000099	1	0.07	0.029177857	39.7	0.00	3.97	0.01
Uranium	772	0.00827	6.38444	3.3	0.0099	0.03267	1	0.07	91.673	1,600	0.06	160	0.57
Vanadium	46.1	0.00827	0.381247	0.0005	0.0099	0.00000495	1	0.07	5.446456429	114	0.05	11.4	0.48
Zinc	79.8	0.00827	0.659946	0.06	0.0099	0.000594	1	0.07	9.436285714	224	0.04	10.5	0.90

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 2. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0143	0.00858	0.0025	0.201	0.0005025	1	2.2	0.004128409	0.62	0.01	0.062	0.07
Arsenic	25.4	0.0143	0.36322	0.001	0.201	0.000201	1	2.2	0.165191364	9.63	0.02	1.91	0.09
Barium	131	0.0143	1.8733	0.008	0.201	0.001608	1	2.2	0.852230909	51	0.02	5.1	0.17
Beryllium	3.6	0.0143	0.05148	0.014	0.201	0.002814	1	2.2	0.024679091	6.2	0.00	0.62	0.04
Cadmium	0.115	0.0143	0.0016445	0.0002	0.201	0.0000402	1	2.2	0.000765773	2.3	0.00	0.23	0.00
Cobalt	23.1	0.0143	0.33033	0.0025	0.201	0.0005025	1	2.2	0.150378409	20	0.01	5	0.03
Copper	26.7	0.0143	0.38181	0.0231	0.201	0.0046431	1	2.2	0.1756605	35.4	0.00	24.3	0.01
Manganese	1820	0.0143	26.026	0.88	0.201	0.17688	1	2.2	11.9104	268	0.04	83	0.14
Nickel	38.6	0.0143	0.55198	0.66	0.201	0.13266	1	2.2	0.3112	42.1	0.01	23.1	0.01
Selenium	0.47	0.0143	0.006721	0.003	0.201	0.000603	1	2.2	0.003329091	0.25	0.01	0.025	0.13
Silver	0.235	0.0143	0.0033605	0.01	0.201	0.00201	1	2.2	0.002441136	2.7	0.00	0.27	0.01
Uranium	772	0.0143	11.0396	3.3	0.201	0.6633	1	2.2	5.3195	5	**1.06**	0.5	**10.64**
Vanadium	46.1	0.0143	0.65923	0.0005	0.201	0.0001005	1	2.2	0.299695682	2.1	0.14	0.21	**1.43**
Zinc	79.8	0.0143	1.14114	0.06	0.201	0.01206	1	2.2	0.524181818	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 10. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000687	0.0004122	0.0052	0.0665	0.0003458	1	0.5	0.001516	0.62	0.002	0.062	0.024
Arsenic	6	0.000687	0.004122	0.0015	0.0665	0.00009975	1	0.5	0.0084435	9.63	0.001	1.91	0.004
Barium	71.6	0.000687	0.0491892	0.0497	0.0665	0.00330505	1	0.5	0.1049885	51	0.002	5.1	0.021
Beryllium	0.56	0.000687	0.00038472	0.00005	0.0665	0.000003325	1	0.5	0.00077609	6.2	0.000	0.62	0.001
Cadmium	1	0.000687	0.000687	0.0015	0.0665	0.00009975	1	0.5	0.0015735	2.3	0.001	0.23	0.007
Cobalt	15	0.000687	0.010305	0.00025	0.0665	0.000016625	1	0.5	0.02064325	20	0.001	5	0.004
Copper	4.1	0.000687	0.0028167	0.0247	0.0665	0.00164255	1	0.5	0.0089185	35.4	0.000	24.3	0.000
Manganese	7480	0.000687	5.13876	0.0398	0.0665	0.0026467	1	0.5	10.2828134	268	0.038	83	0.124
Nickel	32	0.000687	0.021984	0.0021	0.0665	0.00013965	1	0.5	0.0442473	42.1	0.001	23.1	0.002
Selenium	2	0.000687	0.001374	0.002	0.0665	0.000133	1	0.5	0.003014	0.25	0.012	0.025	0.121
Silver	0.025	0.000687	0.000017175	0.00035	0.0665	0.000023275	1	0.5	0.0000809	2.7	0.000	0.27	0.000
Uranium	19.7	0.000687	0.0135339	0.07	0.0665	0.004655	1	0.5	0.0363778	5	0.007	0.5	0.073
Vanadium	9.2	0.000687	0.0063204	0.0043	0.0665	0.00028595	1	0.5	0.0132127	2.1	0.006	0.21	0.063
Zinc	41	0.000687	0.028167	0.0603	0.0665	0.00400995	1	0.5	0.0643539	225	0.000	22.5	0.003

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 10. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000576	0.0003456	0.0052	0.097	0.0005044	1	2.09	0.000406699	NS	N/A	NS	N/A
Arsenic	6	0.000576	0.003456	0.0015	0.097	0.0001455	1	2.09	0.001723206	22.8	0.0001	5.7	0.000
Barium	71.6	0.000576	0.0412416	0.0497	0.097	0.0048209	1	2.09	0.022039474	416.5	0.0001	208.3	0.000
Beryllium	0.56	0.000576	0.00032256	0.00005	0.097	0.00000485	1	2.09	0.000156656	NS	N/A	NS	N/A
Cadmium	1	0.000576	0.000576	0.0015	0.097	0.0001455	1	2.09	0.000345215	3.4	0.0001	0.85	0.000
Cobalt	15	0.000576	0.00864	0.00025	0.097	0.00002425	1	2.09	0.004145574	43.9	0.0001	23.1	0.000
Copper	4.1	0.000576	0.0023616	0.0247	0.097	0.0023959	1	2.09	0.002276316	33.2	0.0001	26.9	0.000
Manganese	7480	0.000576	4.30848	0.0398	0.097	0.0038606	1	2.09	2.063320861	9,770	0.0002	977	0.002
Nickel	32	0.000576	0.018432	0.0021	0.097	0.0002037	1	2.09	0.008916603	79	0.0001	57.2	0.000
Selenium	2	0.000576	0.001152	0.002	0.097	0.000194	1	2.09	0.000644019	0.8	0.0008	0.4	0.002
Silver	0.025	0.000576	0.0000144	0.00035	0.097	0.00003395	1	2.09	2.3134E-05	39.7	0.0000	3.97	0.000
Uranium	19.7	0.000576	0.0113472	0.07	0.097	0.00679	1	2.09	0.008678086	1,600	0.0000	160	0.000
Vanadium	9.2	0.000576	0.0052992	0.0043	0.097	0.0004171	1	2.09	0.002735072	114	0.0000	11.4	0.000
Zinc	41	0.000576	0.023616	0.0603	0.097	0.0058491	1	2.09	0.014098134	224	0.0001	10.5	0.001

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 10. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000895	0.000537	0.0052	0.14	0.000728	1	3.63	0.000348485	NS	N/A	NS	N/A
Arsenic	6	0.000895	0.00537	0.0015	0.14	0.00021	1	3.63	0.00153719	22.8	0.000	5.7	0.000
Barium	71.6	0.000895	0.064082	0.0497	0.14	0.006958	1	3.63	0.019570248	416.5	0.000	208.3	0.000
Beryllium	0.56	0.000895	0.0005012	0.00005	0.14	0.000007	1	3.63	0.00014	NS	N/A	NS	N/A
Cadmium	1	0.000895	0.000895	0.0015	0.14	0.00021	1	3.63	0.000304408	3.4	0.000	0.85	0.000
Cobalt	15	0.000895	0.013425	0.00025	0.14	0.000035	1	3.63	0.003707989	43.9	0.000	23.1	0.000
Copper	4.1	0.000895	0.0036695	0.0247	0.14	0.003458	1	3.63	0.001963499	33.2	0.000	26.9	0.000
Manganese	7480	0.000895	6.6946	0.0398	0.14	0.005572	1	3.63	1.84577741	9,770	0.000	977	0.002
Nickel	32	0.000895	0.02864	0.0021	0.14	0.000294	1	3.63	0.007970799	79	0.000	57.2	0.000
Selenium	2	0.000895	0.00179	0.002	0.14	0.00028	1	3.63	0.000570248	0.8	0.001	0.4	0.001
Silver	0.025	0.000895	0.000022375	0.00035	0.14	0.000049	1	3.63	1.96625E-05	39.7	0.000	3.97	0.000
Uranium	19.7	0.000895	0.0176315	0.07	0.14	0.0098	1	3.63	0.007556887	1,600	0.000	160	0.000
Vanadium	9.2	0.000895	0.008234	0.0043	0.14	0.000602	1	3.63	0.00243416	114	0.000	11.4	0.000
Zinc	41	0.000895	0.036695	0.0603	0.14	0.008442	1	3.63	0.012434435	224	0.000	10.5	0.001

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 10. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0442	0.02652	0.0052	0.04	0.000208	1	0.55	0.048596364	NS	N/A	NS	N/A
Arsenic	6	0.0442	0.2652	0.0015	0.04	0.00006	1	0.55	0.482290909	22.8	0.02	5.7	0.08
Barium	71.6	0.0442	3.16472	0.0497	0.04	0.001988	1	0.55	5.757650909	416.5	0.01	208.3	0.03
Beryllium	0.56	0.0442	0.024752	0.00005	0.04	0.000002	1	0.55	0.045007273	NS	N/A	NS	N/A
Cadmium	1	0.0442	0.0442	0.0015	0.04	0.00006	1	0.55	0.080472727	3.4	0.02	0.85	0.09
Cobalt	15	0.0442	0.663	0.00025	0.04	0.00001	1	0.55	1.205472727	43.9	0.03	23.1	0.05
Copper	4.1	0.0442	0.18122	0.0247	0.04	0.000988	1	0.55	0.331287273	33.2	0.01	26.9	0.01
Manganese	7480	0.0442	330.616	0.0398	0.04	0.001592	1	0.55	601.1228945	9770	0.06	977	0.62
Nickel	32	0.0442	1.4144	0.0021	0.04	0.000084	1	0.55	2.571789091	79	0.03	57.2	0.04
Selenium	2	0.0442	0.0884	0.002	0.04	0.00008	1	0.55	0.160872727	0.8	0.20	0.4	0.40
Silver	0.025	0.0442	0.001105	0.00035	0.04	0.000014	1	0.55	0.002034545	39.7	0.00	3.97	0.00
Uranium	19.7	0.0442	0.87074	0.07	0.04	0.0028	1	0.55	1.588254545	1,600	0.00	160	0.01
Vanadium	9.2	0.0442	0.40664	0.0043	0.04	0.000172	1	0.55	0.739658182	114	0.01	11.4	0.06
Zinc	41	0.0442	1.8122	0.0603	0.04	0.002412	1	0.55	3.299294545	224	0.01	10.5	0.31

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 10. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00827	0.004962	0.0052	0.0099	0.00005148	1	0.07	0.071621143	NS	N/A	NS	N/A
Arsenic	6	0.00827	0.04962	0.0015	0.0099	0.00001485	1	0.07	0.709069286	22.8	0.03	5.7	0.12
Barium	71.6	0.00827	0.592132	0.0497	0.0099	0.00049203	1	0.07	8.466057571	416.5	0.02	208.3	0.04
Beryllium	0.56	0.00827	0.0046312	0.00005	0.0099	0.000000495	1	0.07	0.066167071	NS	N/A	NS	N/A
Cadmium	1	0.00827	0.00827	0.0015	0.0099	0.00001485	1	0.07	0.118355	3.4	0.03	0.85	0.14
Cobalt	15	0.00827	0.12405	0.00025	0.0099	0.000002475	1	0.07	1.772178214	43.9	0.04	23.1	0.08
Copper	4.1	0.00827	0.033907	0.0247	0.0099	0.00024453	1	0.07	0.487879	33.2	0.01	26.9	0.02
Manganese	7480	0.00827	61.8596	0.0398	0.0099	0.00039402	1	0.07	883.7142003	9770	0.09	977	0.90
Nickel	32	0.00827	0.26464	0.0021	0.0099	0.00002079	1	0.07	3.780868429	79	0.05	57.2	0.07
Selenium	2	0.00827	0.01654	0.002	0.0099	0.0000198	1	0.07	0.236568571	0.8	0.30	0.4	0.59
Silver	0.025	0.00827	0.00020675	0.00035	0.0099	0.000003465	1	0.07	0.003003071	39.7	0.00	3.97	0.00
Uranium	19.7	0.00827	0.162919	0.07	0.0099	0.000693	1	0.07	2.337314286	1,600	0.00	160	0.01
Vanadium	9.2	0.00827	0.076084	0.0043	0.0099	0.00004257	1	0.07	1.087522429	114	0.01	11.4	0.10
Zinc	41	0.00827	0.33907	0.0603	0.0099	0.00059697	1	0.07	4.852385286	224	0.02	10.5	0.46

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 10. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0143	0.00858	0.0052	0.201	0.0010452	1	2.2	0.004375091	0.62	0.01	0.062	0.07
Arsenic	6	0.0143	0.0858	0.0015	0.201	0.0003015	1	2.2	0.039137045	9.63	0.00	1.91	0.02
Barium	71.6	0.0143	1.02388	0.0497	0.201	0.0099897	1	2.2	0.469940773	51	0.01	5.1	0.09
Beryllium	0.56	0.0143	0.008008	0.00005	0.201	0.00001005	1	2.2	0.003644568	6.2	0.00	0.62	0.01
Cadmium	1	0.0143	0.0143	0.0015	0.201	0.0003015	1	2.2	0.006637045	2.3	0.00	0.23	0.03
Cobalt	15	0.0143	0.2145	0.00025	0.201	0.00005025	1	2.2	0.097522841	20	0.00	5	0.02
Copper	4.1	0.0143	0.05863	0.0247	0.201	0.0049647	1	2.2	0.028906682	35.4	0.00	24.3	0.00
Manganese	7480	0.0143	106.964	0.0398	0.201	0.0079998	1	2.2	48.62363627	268	0.18	83	0.59
Nickel	32	0.0143	0.4576	0.0021	0.201	0.0004221	1	2.2	0.208191864	42.1	0.00	23.1	0.01
Selenium	2	0.0143	0.0286	0.002	0.201	0.000402	1	2.2	0.013182727	0.25	0.05	0.025	0.53
Silver	0.025	0.0143	0.0003575	0.00035	0.201	0.00007035	1	2.2	0.000194477	2.7	0.00	0.27	0.00
Uranium	19.7	0.0143	0.28171	0.07	0.201	0.01407	1	2.2	0.134445455	5	0.03	0.5	0.27
Vanadium	9.2	0.0143	0.13156	0.0043	0.201	0.0008643	1	2.2	0.060192864	2.1	0.03	0.21	0.29
Zinc	41	0.0143	0.5863	0.0603	0.201	0.0121203	1	2.2	0.272009227	225	0.00	22.5	0.01

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level

TABLE PC 5. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00184	0.001104	0.0052	0.057	0.0002964	1	0.541	0.00258854	0.62	0.00	0.062	0.04
Arsenic	6	0.00184	0.01104	0.0015	0.057	0.0000855	1	0.541	0.020564695	9.63	0.00	1.91	0.01
Barium	71.6	0.00184	0.131744	0.0497	0.057	0.0028329	1	0.541	0.248755823	51	0.00	5.1	0.05
Beryllium	0.56	0.00184	0.0010304	0.00005	0.057	0.00000285	1	0.541	0.001909889	6.2	0.00	0.62	0.00
Cadmium	1	0.00184	0.00184	0.0015	0.057	0.0000855	1	0.541	0.00355915	2.3	0.00	0.23	0.02
Cobalt	15	0.00184	0.0276	0.00025	0.057	0.00001425	1	0.541	0.051042976	20	0.00	5	0.01
Copper	4.1	0.00184	0.007544	0.0247	0.057	0.0014079	1	0.541	0.01654695	35.4	0.00	24.3	0.00
Manganese	7480	0.00184	13.7632	0.0398	0.057	0.0022686	1	0.541	25.44448909	268	0.09	83	0.31
Nickel	32	0.00184	0.05888	0.0021	0.057	0.0001197	1	0.541	0.109056747	42.1	0.00	23.1	0.00
Selenium	2	0.00184	0.00368	0.002	0.057	0.000114	1	0.541	0.007012939	0.25	0.03	0.025	0.28
Silver	0.025	0.00184	0.000046	0.00035	0.057	0.00001995	1	0.541	0.000121904	2.7	0.00	0.27	0.00
Uranium	19.7	0.00184	0.036248	0.07	0.057	0.00399	1	0.541	0.074377079	5	0.01	0.5	0.15
Vanadium	9.2	0.00184	0.016928	0.0043	0.057	0.0002451	1	0.541	0.031743253	2.1	0.02	0.21	0.15
Zinc	41	0.00184	0.07544	0.0603	0.057	0.0034371	1	0.541	0.145798706	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 8. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000687	0.00044655	0.0048	0.0665	0.0003192	1	0.5	0.0015315	0.62	0.002	0.062	0.025
Arsenic	17.8	0.000687	0.0122286	0.0093	0.0665	0.00061845	1	0.5	0.0256941	9.63	0.003	1.91	0.013
Barium	135	0.000687	0.092745	0.105	0.0665	0.0069825	1	0.5	0.199455	51	0.004	5.1	0.039
Beryllium	1.3	0.000687	0.0008931	0.00005	0.0665	0.000003325	1	0.5	0.00179285	6.2	0.000	0.62	0.003
Cadmium	0.7	0.000687	0.0004809	0.0044	0.0665	0.0002926	1	0.5	0.001547	2.3	0.001	0.23	0.007
Cobalt	23.3	0.000687	0.0160071	0.0024	0.0665	0.0001596	1	0.5	0.0323334	20	0.002	5	0.006
Copper	29.9	0.000687	0.0205413	0.051	0.0665	0.0033915	1	0.5	0.0478656	35.4	0.001	24.3	0.002
Manganese	2240	0.000687	1.53888	15.9	0.0665	1.05735	1	0.5	5.19246	268	0.019	83	0.063
Nickel	34.9	0.000687	0.0239763	0.32	0.0665	0.02128	1	0.5	0.0905126	42.1	0.002	23.1	0.004
Selenium	0.5	0.000687	0.0003435	0.0005	0.0665	0.00003325	1	0.5	0.0007535	0.25	0.003	0.025	0.030
Silver	0.66	0.000687	0.00045342	0.01	0.0665	0.000665	1	0.5	0.00223684	2.7	0.001	0.27	0.008
Uranium	78.5	0.000687	0.0539295	0.13	0.0665	0.008645	1	0.5	0.125149	5	0.025	0.5	0.250
Vanadium	35.5	0.000687	0.0243885	0.0082	0.0665	0.0005453	1	0.5	0.0498676	2.1	0.024	0.21	0.237
Zinc	97.7	0.000687	0.0671199	0.38	0.0665	0.02527	1	0.5	0.1847798	225	0.001	22.5	0.008

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 8. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000576	0.0003744	0.0048	0.097	0.0004656	1	2.09	0.000401914	NS	N/A	NS	N/A
Arsenic	17.8	0.000576	0.0102528	0.0093	0.097	0.0009021	1	2.09	0.005337273	22.8	0.0002	5.7	0.001
Barium	135	0.000576	0.07776	0.105	0.097	0.010185	1	2.09	0.042078947	416.5	0.0001	208.3	0.000
Beryllium	1.3	0.000576	0.0007488	0.00005	0.097	0.00000485	1	2.09	0.000360598	NS	N/A	NS	N/A
Cadmium	0.7	0.000576	0.0004032	0.0044	0.097	0.0004268	1	2.09	0.000397129	3.4	0.0001	0.85	0.000
Cobalt	23.3	0.000576	0.0134208	0.0024	0.097	0.0002328	1	2.09	0.006532823	43.9	0.0001	23.1	0.000
Copper	29.9	0.000576	0.0172224	0.051	0.097	0.004947	1	2.09	0.010607368	33.2	0.0003	26.9	0.000
Manganese	2240	0.000576	1.29024	15.9	0.097	1.5423	1	2.09	1.355282297	9,770	0.0001	977	0.001
Nickel	34.9	0.000576	0.0201024	0.32	0.097	0.03104	1	2.09	0.024470048	79	0.0003	57.2	0.000
Selenium	0.5	0.000576	0.000288	0.0005	0.097	0.0000485	1	2.09	0.000161005	0.8	0.0002	0.4	0.000
Silver	0.66	0.000576	0.00038016	0.01	0.097	0.00097	1	2.09	0.00064601	39.7	0.0000	3.97	0.000
Uranium	78.5	0.000576	0.045216	0.13	0.097	0.01261	1	2.09	0.027667943	1,600	0.0000	160	0.000
Vanadium	35.5	0.000576	0.020448	0.0082	0.097	0.0007954	1	2.09	0.010164306	114	0.0001	11.4	0.001
Zinc	97.7	0.000576	0.0562752	0.38	0.097	0.03686	1	2.09	0.044562297	224	0.0002	10.5	0.004

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 8. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000895	0.00058175	0.0048	0.14	0.000672	1	3.63	0.000345386	NS	N/A	NS	N/A
Arsenic	17.8	0.000895	0.015931	0.0093	0.14	0.001302	1	3.63	0.004747383	22.8	0.000	5.7	0.001
Barium	135	0.000895	0.120825	0.105	0.14	0.0147	1	3.63	0.037334711	416.5	0.000	208.3	0.000
Beryllium	1.3	0.000895	0.0011635	0.00005	0.14	0.000007	1	3.63	0.000322452	NS	N/A	NS	N/A
Cadmium	0.7	0.000895	0.0006265	0.0044	0.14	0.000616	1	3.63	0.000342287	3.4	0.000	0.85	0.000
Cobalt	23.3	0.000895	0.0208535	0.0024	0.14	0.000336	1	3.63	0.005837328	43.9	0.000	23.1	0.000
Copper	29.9	0.000895	0.0267605	0.051	0.14	0.00714	1	3.63	0.009338981	33.2	0.000	26.9	0.000
Manganese	2240	0.000895	2.0048	15.9	0.14	2.226	1	3.63	1.165509642	9,770	0.000	977	0.001
Nickel	34.9	0.000895	0.0312355	0.32	0.14	0.0448	1	3.63	0.020946419	79	0.000	57.2	0.000
Selenium	0.5	0.000895	0.0004475	0.0005	0.14	0.00007	1	3.63	0.000142562	0.8	0.000	0.4	0.000
Silver	0.66	0.000895	0.0005907	0.01	0.14	0.0014	1	3.63	0.000548402	39.7	0.000	3.97	0.000
Uranium	78.5	0.000895	0.0702575	0.13	0.14	0.0182	1	3.63	0.024368457	1,600	0.000	160	0.000
Vanadium	35.5	0.000895	0.0317725	0.0082	0.14	0.001148	1	3.63	0.009069008	114	0.000	11.4	0.001
Zinc	97.7	0.000895	0.0874415	0.38	0.14	0.0532	1	3.63	0.038744215	224	0.000	10.5	0.004

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
N/A:	Value could not be calculated with the information available

TABLE PK 8. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0442	0.02873	0.0048	0.04	0.000192	1	0.55	0.052585455	NS	N/A	NS	N/A
Arsenic	17.8	0.0442	0.78676	0.0093	0.04	0.000372	1	0.55	1.431149091	22.8	0.06	5.7	0.25
Barium	135	0.0442	5.967	0.105	0.04	0.0042	1	0.55	10.85672727	416.5	0.03	208.3	0.05
Beryllium	1.3	0.0442	0.05746	0.00005	0.04	0.000002	1	0.55	0.104476364	NS	N/A	NS	N/A
Cadmium	0.7	0.0442	0.03094	0.0044	0.04	0.000176	1	0.55	0.056574545	3.4	0.02	0.85	0.07
Cobalt	23.3	0.0442	1.02986	0.0024	0.04	0.000096	1	0.55	1.872647273	43.9	0.04	23.1	0.08
Copper	29.9	0.0442	1.32158	0.051	0.04	0.00204	1	0.55	2.406581818	33.2	0.07	26.9	0.09
Manganese	2240	0.0442	99.008	15.9	0.04	0.636	1	0.55	181.1709091	9770	0.02	977	0.19
Nickel	34.9	0.0442	1.54258	0.32	0.04	0.0128	1	0.55	2.827963636	79	0.04	57.2	0.05
Selenium	0.5	0.0442	0.0221	0.0005	0.04	0.00002	1	0.55	0.040218182	0.8	0.05	0.4	0.10
Silver	0.66	0.0442	0.029172	0.01	0.04	0.0004	1	0.55	0.053767273	39.7	0.00	3.97	0.01
Uranium	78.5	0.0442	3.4697	0.13	0.04	0.0052	1	0.55	6.318	1,600	0.00	160	0.04
Vanadium	35.5	0.0442	1.5691	0.0082	0.04	0.000328	1	0.55	2.853505455	114	0.03	11.4	0.25
Zinc	97.7	0.0442	4.31834	0.38	0.04	0.0152	1	0.55	7.879163636	224	0.04	10.5	0.75

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 8. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00827	0.0053755	0.0048	0.0099	0.00004752	1	0.07	0.077471714	NS	N/A	NS	N/A
Arsenic	17.8	0.00827	0.147206	0.0093	0.0099	0.00009207	1	0.07	2.104258143	22.8	0.09	5.7	0.37
Barium	135	0.00827	1.11645	0.105	0.0099	0.0010395	1	0.07	15.96413571	416.5	0.04	208.3	0.08
Beryllium	1.3	0.00827	0.010751	0.00005	0.0099	0.000000495	1	0.07	0.153592786	NS	N/A	NS	N/A
Cadmium	0.7	0.00827	0.005789	0.0044	0.0099	0.00004356	1	0.07	0.083322286	3.4	0.02	0.85	0.10
Cobalt	23.3	0.00827	0.192691	0.0024	0.0099	0.00002376	1	0.07	2.753068	43.9	0.06	23.1	0.12
Copper	29.9	0.00827	0.247273	0.051	0.0099	0.0005049	1	0.07	3.539684286	33.2	0.11	26.9	0.13
Manganese	2240	0.00827	18.5248	15.9	0.0099	0.15741	1	0.07	266.8887143	9770	0.03	977	0.27
Nickel	34.9	0.00827	0.288623	0.32	0.0099	0.003168	1	0.07	4.168442857	79	0.05	57.2	0.07
Selenium	0.5	0.00827	0.004135	0.0005	0.0099	0.00000495	1	0.07	0.059142143	0.8	0.07	0.4	0.15
Silver	0.66	0.00827	0.0054582	0.01	0.0099	0.000099	1	0.07	0.079388571	39.7	0.00	3.97	0.02
Uranium	78.5	0.00827	0.649195	0.13	0.0099	0.001287	1	0.07	9.2926	1,600	0.01	160	0.06
Vanadium	35.5	0.00827	0.293585	0.0082	0.0099	0.00008118	1	0.07	4.195231143	114	0.04	11.4	0.37
Zinc	97.7	0.00827	0.807979	0.38	0.0099	0.003762	1	0.07	11.5963	224	0.05	10.5	**1.10**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 8. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations,
AOI: Upper Eastern Drainage, instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0143	0.009295	0.0048	0.201	0.0009648	1	2.2	0.004663545	0.62	0.01	0.062	0.08
Arsenic	17.8	0.0143	0.25454	0.0093	0.201	0.0018693	1	2.2	0.116549682	9.63	0.01	1.91	0.06
Barium	135	0.0143	1.9305	0.105	0.201	0.021105	1	2.2	0.887093182	51	0.02	5.1	0.17
Beryllium	1.3	0.0143	0.01859	0.00005	0.201	0.00001005	1	2.2	0.008454568	6.2	0.00	0.62	0.01
Cadmium	0.7	0.0143	0.01001	0.0044	0.201	0.0008844	1	2.2	0.004952	2.3	0.00	0.23	0.02
Cobalt	23.3	0.0143	0.33319	0.0024	0.201	0.0004824	1	2.2	0.151669273	20	0.01	5	0.03
Copper	29.9	0.0143	0.42757	0.051	0.201	0.010251	1	2.2	0.199009545	35.4	0.01	24.3	0.01
Manganese	2240	0.0143	32.032	15.9	0.201	3.1959	1	2.2	16.01268182	268	0.06	83	0.19
Nickel	34.9	0.0143	0.49907	0.32	0.201	0.06432	1	2.2	0.256086364	42.1	0.01	23.1	0.01
Selenium	0.5	0.0143	0.00715	0.0005	0.201	0.0001005	1	2.2	0.003295682	0.25	0.01	0.025	0.13
Silver	0.66	0.0143	0.009438	0.01	0.201	0.00201	1	2.2	0.005203636	2.7	0.00	0.27	0.02
Uranium	78.5	0.0143	1.12255	0.13	0.201	0.02613	1	2.2	0.522127273	5	0.10	0.5	**1.04**
Vanadium	35.5	0.0143	0.50765	0.0082	0.201	0.0016482	1	2.2	0.231499182	2.1	0.11	0.21	1.10
Zinc	97.7	0.0143	1.39711	0.38	0.201	0.07638	1	2.2	0.669768182	225	0.00	22.5	0.03

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level

TABLE PC 3. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00184	0.001196	0.0048	0.057	0.0002736	1	0.541	0.002716451	0.62	0.00	0.062	0.04
Arsenic	17.8	0.00184	0.032752	0.0093	0.057	0.0005301	1	0.541	0.061519593	9.63	0.01	1.91	0.03
Barium	135	0.00184	0.2484	0.105	0.057	0.005985	1	0.541	0.470212569	51	0.01	5.1	0.09
Beryllium	1.3	0.00184	0.002392	0.00005	0.057	0.00000285	1	0.541	0.00442671	6.2	0.00	0.62	0.01
Cadmium	0.7	0.00184	0.001288	0.0044	0.057	0.0002508	1	0.541	0.002844362	2.3	0.00	0.23	0.01
Cobalt	23.3	0.00184	0.042872	0.0024	0.057	0.0001368	1	0.541	0.079498706	20	0.00	5	0.02
Copper	29.9	0.00184	0.055016	0.051	0.057	0.002907	1	0.541	0.107066543	35.4	0.00	24.3	0.00
Manganese	2240	0.00184	4.1216	15.9	0.057	0.9063	1	0.541	9.293715342	268	0.03	83	0.11
Nickel	34.9	0.00184	0.064216	0.32	0.057	0.01824	1	0.541	0.152414048	42.1	0.00	23.1	0.01
Selenium	0.5	0.00184	0.00092	0.0005	0.057	0.0000285	1	0.541	0.001753235	0.25	0.01	0.025	0.07
Silver	0.66	0.00184	0.0012144	0.01	0.057	0.00057	1	0.541	0.003298336	2.7	0.00	0.27	0.01
Uranium	78.5	0.00184	0.14444	0.13	0.057	0.00741	1	0.541	0.280683919	5	0.06	0.5	0.56
Vanadium	35.5	0.00184	0.06532	0.0082	0.057	0.0004674	1	0.541	0.121603327	2.1	0.06	0.21	0.58
Zinc	97.7	0.00184	0.179768	0.38	0.057	0.02166	1	0.541	0.372325323	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 6. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.000687	0.0003435	0.0005	0.0665	0.00003325	1	0.5	0.0007535	0.62	0.001	0.062	0.012
Arsenic	5.8	0.000687	0.0039846	0.003	0.0665	0.0001995	1	0.5	0.0083682	9.63	0.001	1.91	0.004
Barium	76.3	0.000687	0.0524181	0.058	0.0665	0.003857	1	0.5	0.1125502	51	0.002	5.1	0.022
Beryllium	4.1	0.000687	0.0028167	0.0043	0.0665	0.00028595	1	0.5	0.0062053	6.2	0.001	0.62	0.010
Cadmium	1	0.000687	0.000687	0.005	0.0665	0.0003325	1	0.5	0.002039	2.3	0.001	0.23	0.009
Cobalt	11.2	0.000687	0.0076944	0.0019	0.0665	0.00012635	1	0.5	0.0156415	20	0.001	5	0.003
Copper	20.4	0.000687	0.0140148	0.06	0.0665	0.00399	1	0.5	0.0360096	35.4	0.001	24.3	0.001
Manganese	3130	0.000687	2.15031	15.9	0.0665	1.05735	1	0.5	6.41532	268	0.024	83	0.077
Nickel	28	0.000687	0.019236	0.4	0.0665	0.0266	1	0.5	0.091672	42.1	0.002	23.1	0.004
Selenium	4	0.000687	0.002748	0.001	0.0665	0.0000665	1	0.5	0.005629	0.25	0.023	0.025	0.225
Silver	0.14	0.000687	0.00009618	0.005	0.0665	0.0003325	1	0.5	0.00085736	2.7	0.000	0.27	0.003
Uranium	293	0.000687	0.201291	0.103	0.0665	0.0068495	1	0.5	0.416281	5	0.083	0.5	0.833
Vanadium	12.8	0.000687	0.0087936	0.00025	0.0665	0.000016625	1	0.5	0.01762045	2.1	0.008	0.21	0.084
Zinc	93	0.000687	0.063891	0.5	0.0665	0.03325	1	0.5	0.194282	225	0.001	22.5	0.009

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PQ 6. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.000576	0.000288	0.0005	0.097	0.0000485	1	2.09	0.000161005	NS	N/A	NS	N/A
Arsenic	5.8	0.000576	0.0033408	0.003	0.097	0.000291	1	2.09	0.001737703	22.8	0.0001	5.7	0.000
Barium	76.3	0.000576	0.0439488	0.058	0.097	0.005626	1	2.09	0.02372	416.5	0.0001	208.3	0.000
Beryllium	4.1	0.000576	0.0023616	0.0043	0.097	0.0004171	1	2.09	0.001329522	NS	N/A	NS	N/A
Cadmium	1	0.000576	0.000576	0.005	0.097	0.000485	1	2.09	0.000507656	3.4	0.0001	0.85	0.001
Cobalt	11.2	0.000576	0.0064512	0.0019	0.097	0.0001843	1	2.09	0.00317488	43.9	0.0001	23.1	0.000
Copper	20.4	0.000576	0.0117504	0.06	0.097	0.00582	1	2.09	0.00840689	33.2	0.0003	26.9	0.000
Manganese	3130	0.000576	1.80288	15.9	0.097	1.5423	1	2.09	1.600564593	9,770	0.0002	977	0.002
Nickel	28	0.000576	0.016128	0.4	0.097	0.0388	1	2.09	0.02628134	79	0.0003	57.2	0.000
Selenium	4	0.000576	0.002304	0.001	0.097	0.000097	1	2.09	0.001148804	0.8	0.0014	0.4	0.003
Silver	0.14	0.000576	0.00008064	0.005	0.097	0.000485	1	2.09	0.000270641	39.7	0.0000	3.97	0.000
Uranium	293	0.000576	0.168768	0.103	0.097	0.009991	1	2.09	0.085530622	1,600	0.0001	160	0.001
Vanadium	12.8	0.000576	0.0073728	0.00025	0.097	0.00002425	1	2.09	0.003539258	114	0.0000	11.4	0.000
Zinc	93	0.000576	0.053568	0.5	0.097	0.0485	1	2.09	0.048836364	224	0.0002	10.5	0.005

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PR 6. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.000895	0.0004475	0.0005	0.14	0.00007	1	3.63	0.000142562	NS	N/A	NS	N/A
Arsenic	5.8	0.000895	0.005191	0.003	0.14	0.00042	1	3.63	0.00154573	22.8	0.000	5.7	0.000
Barium	76.3	0.000895	0.0682885	0.058	0.14	0.00812	1	3.63	0.021049174	416.5	0.000	208.3	0.000
Beryllium	4.1	0.000895	0.0036695	0.0043	0.14	0.000602	1	3.63	0.001176722	NS	N/A	NS	N/A
Cadmium	1	0.000895	0.000895	0.005	0.14	0.0007	1	3.63	0.000439394	3.4	0.000	0.85	0.001
Cobalt	11.2	0.000895	0.010024	0.0019	0.14	0.000266	1	3.63	0.002834711	43.9	0.000	23.1	0.000
Copper	20.4	0.000895	0.018258	0.06	0.14	0.0084	1	3.63	0.007343802	33.2	0.000	26.9	0.000
Manganese	3130	0.000895	2.80135	15.9	0.14	2.226	1	3.63	1.384944904	9,770	0.000	977	0.001
Nickel	28	0.000895	0.02506	0.4	0.14	0.056	1	3.63	0.022330579	79	0.000	57.2	0.000
Selenium	4	0.000895	0.00358	0.001	0.14	0.00014	1	3.63	0.001024793	0.8	0.001	0.4	0.003
Silver	0.14	0.000895	0.0001253	0.005	0.14	0.0007	1	3.63	0.000227355	39.7	0.000	3.97	0.000
Uranium	293	0.000895	0.262235	0.103	0.14	0.01442	1	3.63	0.076213499	1,600	0.000	160	0.000
Vanadium	12.8	0.000895	0.011456	0.00025	0.14	0.000035	1	3.63	0.003165565	114	0.000	11.4	0.000
Zinc	93	0.000895	0.083235	0.5	0.14	0.07	1	3.63	0.042213499	224	0.000	10.5	0.004

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PK 6. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.0442	0.0221	0.0005	0.04	0.00002	1	0.55	0.040218182	NS	N/A	NS	N/A
Arsenic	5.8	0.0442	0.25636	0.003	0.04	0.00012	1	0.55	0.466327273	22.8	0.02	5.7	0.08
Barium	76.3	0.0442	3.37246	0.058	0.04	0.00232	1	0.55	6.135963636	416.5	0.01	208.3	0.03
Beryllium	4.1	0.0442	0.18122	0.0043	0.04	0.000172	1	0.55	0.329803636	NS	N/A	NS	N/A
Cadmium	1	0.0442	0.0442	0.005	0.04	0.0002	1	0.55	0.080727273	3.4	0.02	0.85	0.09
Cobalt	11.2	0.0442	0.49504	0.0019	0.04	0.000076	1	0.55	0.900210909	43.9	0.02	23.1	0.04
Copper	20.4	0.0442	0.90168	0.06	0.04	0.0024	1	0.55	1.643781818	33.2	0.05	26.9	0.06
Manganese	3130	0.0442	138.346	15.9	0.04	0.636	1	0.55	252.6945455	9770	0.03	977	0.26
Nickel	28	0.0442	1.2376	0.4	0.04	0.016	1	0.55	2.279272727	79	0.03	57.2	0.04
Selenium	4	0.0442	0.1768	0.001	0.04	0.00004	1	0.55	0.321527273	0.8	0.40	0.4	0.80
Silver	0.14	0.0442	0.006188	0.005	0.04	0.0002	1	0.55	0.011614545	39.7	0.00	3.97	0.00
Uranium	293	0.0442	12.9506	0.103	0.04	0.00412	1	0.55	23.55403636	1,600	0.01	160	0.15
Vanadium	12.8	0.0442	0.56576	0.00025	0.04	0.00001	1	0.55	1.028672727	114	0.01	11.4	0.09
Zinc	93	0.0442	4.1106	0.5	0.04	0.02	1	0.55	7.510181818	224	0.03	10.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 6. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.00827	0.004135	0.0005	0.0099	0.00000495	1	0.07	0.059142143	NS	N/A	NS	N/A
Arsenic	5.8	0.00827	0.047966	0.003	0.0099	0.0000297	1	0.07	0.685652857	22.8	0.03	5.7	0.12
Barium	76.3	0.00827	0.631001	0.058	0.0099	0.0005742	1	0.07	9.022502857	416.5	0.02	208.3	0.04
Beryllium	4.1	0.00827	0.033907	0.0043	0.0099	0.00004257	1	0.07	0.484993857	NS	N/A	NS	N/A
Cadmium	1	0.00827	0.00827	0.005	0.0099	0.0000495	1	0.07	0.11885	3.4	0.03	0.85	0.14
Cobalt	11.2	0.00827	0.092624	0.0019	0.0099	0.00001881	1	0.07	1.323468714	43.9	0.03	23.1	0.06
Copper	20.4	0.00827	0.168708	0.06	0.0099	0.000594	1	0.07	2.4186	33.2	0.07	26.9	0.09
Manganese	3130	0.00827	25.8851	15.9	0.0099	0.15741	1	0.07	372.0358571	9770	0.04	977	0.38
Nickel	28	0.00827	0.23156	0.4	0.0099	0.00396	1	0.07	3.364571429	79	0.04	57.2	0.06
Selenium	4	0.00827	0.03308	0.001	0.0099	0.0000099	1	0.07	0.472712857	0.8	0.59	0.4	**1.18**
Silver	0.14	0.00827	0.0011578	0.005	0.0099	0.0000495	1	0.07	0.017247143	39.7	0.00	3.97	0.00
Uranium	293	0.00827	2.42311	0.103	0.0099	0.0010197	1	0.07	34.63042429	1,600	0.02	160	0.22
Vanadium	12.8	0.00827	0.105856	0.00025	0.0099	0.000002475	1	0.07	1.512263929	114	0.01	11.4	0.13
Zinc	93	0.00827	0.76911	0.5	0.0099	0.00495	1	0.07	11.058	224	0.05	10.5	**1.05**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 6. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.0143	0.00715	0.0005	0.201	0.0001005	1	2.2	0.003295682	0.62	0.01	0.062	0.05
Arsenic	5.8	0.0143	0.08294	0.003	0.201	0.000603	1	2.2	0.037974091	9.63	0.00	1.91	0.02
Barium	76.3	0.0143	1.09109	0.058	0.201	0.011658	1	2.2	0.501249091	51	0.01	5.1	0.10
Beryllium	4.1	0.0143	0.05863	0.0043	0.201	0.0008643	1	2.2	0.027042864	6.2	0.00	0.62	0.04
Cadmium	1	0.0143	0.0143	0.005	0.201	0.001005	1	2.2	0.006956818	2.3	0.00	0.23	0.03
Cobalt	11.2	0.0143	0.16016	0.0019	0.201	0.0003819	1	2.2	0.072973591	20	0.00	5	0.01
Copper	20.4	0.0143	0.29172	0.06	0.201	0.01206	1	2.2	0.138081818	35.4	0.00	24.3	0.01
Manganese	3130	0.0143	44.759	15.9	0.201	3.1959	1	2.2	21.79768182	268	0.08	83	0.26
Nickel	28	0.0143	0.4004	0.4	0.201	0.0804	1	2.2	0.218545455	42.1	0.01	23.1	0.01
Selenium	4	0.0143	0.0572	0.001	0.201	0.000201	1	2.2	0.026091364	0.25	0.10	0.025	**1.04**
Silver	0.14	0.0143	0.002002	0.005	0.201	0.001005	1	2.2	0.001366818	2.7	0.00	0.27	0.01
Uranium	293	0.0143	4.1899	0.103	0.201	0.020703	1	2.2	1.913910455	5	0.38	0.5	**3.83**
Vanadium	12.8	0.0143	0.18304	0.00025	0.201	0.00005025	1	2.2	0.083222841	2.1	0.04	0.21	0.40
Zinc	93	0.0143	1.3299	0.5	0.201	0.1005	1	2.2	0.650181818	225	0.00	22.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 1. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.00184	0.00092	0.0005	0.057	0.0000285	1	0.541	0.001753235	0.62	0.00	0.062	0.03
Arsenic	5.8	0.00184	0.010672	0.003	0.057	0.000171	1	0.541	0.020042514	9.63	0.00	1.91	0.01
Barium	76.3	0.00184	0.140392	0.058	0.057	0.003306	1	0.541	0.265615527	51	0.01	5.1	0.05
Beryllium	4.1	0.00184	0.007544	0.0043	0.057	0.0002451	1	0.541	0.014397597	6.2	0.00	0.62	0.02
Cadmium	1	0.00184	0.00184	0.005	0.057	0.000285	1	0.541	0.003927911	2.3	0.00	0.23	0.02
Cobalt	11.2	0.00184	0.020608	0.0019	0.057	0.0001083	1	0.541	0.038292606	20	0.00	5	0.01
Copper	20.4	0.00184	0.037536	0.06	0.057	0.00342	1	0.541	0.075704251	35.4	0.00	24.3	0.00
Manganese	3130	0.00184	5.7592	15.9	0.057	0.9063	1	0.541	12.3207024	268	0.05	83	0.15
Nickel	28	0.00184	0.05152	0.4	0.057	0.0228	1	0.541	0.137375231	42.1	0.00	23.1	0.01
Selenium	4	0.00184	0.00736	0.001	0.057	0.000057	1	0.541	0.013709797	0.25	0.05	0.025	0.55
Silver	0.14	0.00184	0.0002576	0.005	0.057	0.000285	1	0.541	0.001002957	2.7	0.00	0.27	0.00
Uranium	293	0.00184	0.53912	0.103	0.057	0.005871	1	0.541	1.007377079	5	0.20	0.5	**2.01**
Vanadium	12.8	0.00184	0.023552	0.00025	0.057	0.00001425	1	0.541	0.043560536	2.1	0.02	0.21	0.21
Zinc	93	0.00184	0.17112	0.5	0.057	0.0285	1	0.541	0.368983364	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 30. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	1.6	0.000687	0.0010992	0.0025	0.0665	0.00016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	75	0.000687	0.051525	0.0071	0.0665	0.00047215	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	131	0.000687	0.089997	0.022	0.0665	0.001463	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	1.1	0.000687	0.0007557	0.0278	0.0665	0.0018487	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	0.14	0.000687	0.00009618	0.009	0.0665	0.0005985	73	0.657	100	0.408313	0.26826164	1	0.5	0.537912642	2.3	0.234	0.23	**2.339**
Cobalt	11.3	0.000687	0.0077631	0.792	0.0665	0.052668	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	87.8	0.000687	0.0603186	1.19	0.0665	0.079135	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	352	0.000687	0.241824	36.8	0.0665	2.4472	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	29	0.000687	0.019923	1.26	0.0665	0.08379	61	76.86	100	0.408313	31.3829372	1	0.5	62.97330036	42.1	**1.496**	23.1	**2.726**
Selenium	0.55	0.000687	0.00037785	0.0272	0.0665	0.0018088	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.275	0.000687	0.000188925	0.001	0.0665	0.0000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	104	0.000687	0.071448	8.17	0.0665	0.543305	50	408.5	100	0.408313	166.795861	1	0.5	334.821227	5	**66.964**	0.5	**669.642**
Vanadium	66.3	0.000687	0.0455481	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	74.5	0.000687	0.0511815	1.33	0.0665	0.088445	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 17. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Blood Pool, Instream Sediements
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	1.6	0.000576	0.0009216	0.0025	0.097	0.0002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	75	0.000576	0.0432	0.0071	0.097	0.0006887	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	131	0.000576	0.075456	0.022	0.097	0.002134	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	1.1	0.000576	0.0006336	0.0278	0.097	0.0026966	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	0.14	0.000576	0.00008064	0.009	0.097	0.000873	73	0.657	100	0.342424	0.22497257	1	2.09	0.108098664	3.4	0.0318	0.85	0.127
Cobalt	11.3	0.000576	0.0065088	0.792	0.097	0.076824	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	87.8	0.000576	0.0505728	1.19	0.097	0.11543	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	352	0.000576	0.202752	36.8	0.097	3.5696	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	29	0.000576	0.016704	1.26	0.097	0.12222	61	76.86	100	0.342424	26.3187086	1	2.09	12.65915437	79	0.1602	57.2	0.221
Selenium	0.55	0.000576	0.0003168	0.0272	0.097	0.0026384	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.275	0.000576	0.0001584	0.001	0.097	0.000097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	104	0.000576	0.059904	8.17	0.097	0.79249	50	408.5	100	0.342424	139.880204	1	2.09	67.33617129	1,600	0.0421	160	0.421
Vanadium	66.3	0.000576	0.0381888	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	74.5	0.000576	0.042912	1.33	0.097	0.12901	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 17. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.6	0.000895	0.001432	0.0025	0.14	0.00035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	75	0.000895	0.067125	0.0071	0.14	0.000994	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	131	0.000895	0.117245	0.022	0.14	0.00308	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	1.1	0.000895	0.0009845	0.0278	0.14	0.003892	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	0.14	0.000895	0.0001253	0.009	0.14	0.00126	73	0.657	100	0.532105	0.349592985	1	3.63	0.09668823	3.4	0.028	0.85	0.114
Cobalt	11.3	0.000895	0.0101135	0.792	0.14	0.11088	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	87.8	0.000895	0.078581	1.19	0.14	0.1666	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	352	0.000895	0.31504	36.8	0.14	5.152	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	29	0.000895	0.025955	1.26	0.14	0.1764	61	76.86	100	0.532105	40.8975903	1	3.63	11.322299	79	0.143	57.2	0.198
Selenium	0.55	0.000895	0.00049225	0.0272	0.14	0.003808	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.275	0.000895	0.000246125	0.001	0.14	0.00014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	104	0.000895	0.09308	8.17	0.14	1.1438	50	408.5	100	0.532105	217.3648925	1	3.63	60.220874	1,600	0.038	160	0.376
Vanadium	66.3	0.000895	0.0593385	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	74.5	0.000895	0.0666775	1.33	0.14	0.1862	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 33. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.55	0.000687	0.00037785	0.00025	0.0665	0.000016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	11.4	0.000687	0.0078318	0.0007	0.0665	0.00004655	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	119	0.000687	0.081753	0.0165	0.0665	0.00109725	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	4.2	0.000687	0.0028854	0.0032	0.0665	0.0002128	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	2.8	0.000687	0.0019236	0.053	0.0665	0.0035245	73	3.869	100	0.408313	1.579763	1	0.5	3.170422194	2.3	**1.378**	0.23	**13.784**
Cobalt	99.2	0.000687	0.0681504	0.06	0.0665	0.00399	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	29.1	0.000687	0.0199917	0.08	0.0665	0.00532	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	4710	0.000687	3.23577	91.2	0.0665	6.0648	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	230	0.000687	0.15801	1.38	0.0665	0.09177	61	84.18	100	0.408313	34.3717883	1	0.5	69.24313668	42.1	**1.645**	23.1	**2.998**
Selenium	5.2	0.000687	0.0035724	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.215	0.000687	0.000147705	0.01	0.0665	0.000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	3640	0.000687	2.50068	0.727	0.0665	0.0483455	50	36.35	100	0.408313	14.8421776	1	0.5	34.7824061	5	**6.956**	0.5	**69.565**
Vanadium	28.2	0.000687	0.0193734	0.00051	0.0665	0.000033915	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	598	0.000687	0.410826	3	0.0665	0.1995	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 20. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.55	0.000576	0.0003168	0.00025	0.097	0.00002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	11.4	0.000576	0.0065664	0.0007	0.097	0.0000679	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	119	0.000576	0.068544	0.0165	0.097	0.0016005	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	4.2	0.000576	0.0024192	0.0032	0.097	0.0003104	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	2.8	0.000576	0.0016128	0.053	0.097	0.005141	73	3.869	100	0.342424	1.32483846	1	2.09	0.637125481	3.4	0.1874	0.85	0.750
Cobalt	99.2	0.000576	0.0571392	0.06	0.097	0.00582	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	29.1	0.000576	0.0167616	0.08	0.097	0.00776	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	4710	0.000576	2.71296	91.2	0.097	8.8464	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	230	0.000576	0.13248	1.38	0.097	0.13386	61	84.18	100	0.342424	28.8252523	1	2.09	13.91942216	79	0.1762	57.2	0.243
Selenium	5.2	0.000576	0.0029952	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.215	0.000576	0.00012384	0.01	0.097	0.00097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	3640	0.000576	2.09664	0.727	0.097	0.070519	50	36.35	100	0.342424	12.4471124	1	2.09	6.992474354	1,600	0.0044	160	0.044
Vanadium	28.2	0.000576	0.0162432	0.00051	0.097	0.00004947	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	598	0.000576	0.344448	3	0.097	0.291	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
BAF:	Bioaccumulation factor
ND:	Not defined; database insufficient to derive values
N/A:	Value could not be calculated with the information available

TABLE PR 20. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.55	0.000895	0.00049225	0.00025	0.14	0.000035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	11.4	0.000895	0.010203	0.0007	0.14	0.000098	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	119	0.000895	0.106505	0.0165	0.14	0.00231	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	4.2	0.000895	0.003759	0.0032	0.14	0.000448	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	2.8	0.000895	0.002506	0.053	0.14	0.00742	73	3.869	100	0.532105	2.058714245	1	3.63	0.56987335	3.4	0.168	0.85	0.670
Cobalt	99.2	0.000895	0.088784	0.06	0.14	0.0084	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	29.1	0.000895	0.0260445	0.08	0.14	0.0112	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	4710	0.000895	4.21545	91.2	0.14	12.768	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	230	0.000895	0.20585	1.38	0.14	0.1932	61	84.18	100	0.532105	44.7925989	1	3.63	12.4494901	79	0.158	57.2	0.218
Selenium	5.2	0.000895	0.004654	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.215	0.000895	0.000192425	0.01	0.14	0.0014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	3640	0.000895	3.2578	0.727	0.14	0.10178	50	36.35	100	0.532105	19.34201675	1	3.63	6.2538834	1,600	0.004	160	0.039
Vanadium	28.2	0.000895	0.025239	0.00051	0.14	0.0000714	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	598	0.000895	0.53521	3	0.14	0.42	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 28. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.0442	0.02431	0.00025	0.04	0.00001	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	11.4	0.0442	0.50388	0.0007	0.04	0.000028	0.25	21	5	79	0.0392	0.156898	1	0.55	1.20146545	22.8	0.05	5.7	0.21
Barium	119	0.0442	5.2598	0.0165	0.04	0.00066	2.2	21	74	79	0.0392	2.3097424	1	0.55	13.7640044	416.5	0.03	208.3	0.07
Beryllium	4.2	0.0442	0.18564	0.0032	0.04	0.000128	0.41	21	12.7	79	0.0392	0.39666872	1	0.55	1.05897585	NS	N/A	NS	N/A
Cadmium	2.8	0.0442	0.12376	0.053	0.04	0.00212	2	21	1.5	79	0.0392	0.062916	1	0.55	0.34326545	3.4	0.10	0.85	0.40
Cobalt	99.2	0.0442	4.38464	0.06	0.04	0.0024	0.46	21	27.8	79	0.0392	0.86469712	1	0.55	9.54861295	43.9	0.22	23.1	0.41
Copper	29.1	0.0442	1.28622	0.08	0.04	0.0032	37.2	21	73	79	0.0392	2.5668944	1	0.55	7.01148073	33.2	0.21	26.9	0.26
Manganese	4710	0.0442	208.182	91.2	0.04	3.648	688	21	17200	79	0.0392	538.313216	1	0.55	1363.89676	9770	0.14	977	**1.40**
Nickel	230	0.0442	10.166	1.38	0.04	0.0552	5	21	71	79	0.0392	2.239888	1	0.55	22.6565236	79	0.29	57.2	0.40
Selenium	5.2	0.0442	0.22984	0.0005	0.04	0.00002	0.6	21	0.3	79	0.0392	0.0142296	1	0.55	0.44379927	0.8	0.55	0.4	**1.11**
Silver	0.215	0.0442	0.009503	0.01	0.04	0.0004	0.88	21	3.6	79	0.0392	0.11872896	1	0.55	0.23387629	39.7	0.01	3.97	0.06
Uranium	3640	0.0442	160.888	0.727	0.04	0.02908	35.9	21	1177.04835	79	0.0392	36.7463621	1	0.55	359.388077	1,600	0.22	160	**2.25**
Vanadium	28.2	0.0442	1.24644	0.00051	0.04	0.0000204	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	598	0.0442	26.4316	3	0.04	0.12	183	21	115	79	0.0392	5.067776	1	0.55	57.4897745	224	0.26	10.5	**5.48**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 28. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
Antimony	0.55	0.0143	0.007865	0.00025	0.201	0.00005025	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	11.4	0.0143	0.16302	0.0007	0.201	0.0001407	5	61	0.25	39	0.1377	0.43341075	1	2.2	0.271168841	9.63	0.03	1.91	0.14
Barium	119	0.0143	1.7017	0.0165	0.201	0.0033165	74	61	2.2	39	0.1377	6.3339246	1	2.2	3.654064136	51	0.07	5.1	0.72
Beryllium	4.2	0.0143	0.06006	0.0032	0.201	0.0006432	12.7	61	0.41	39	0.1377	1.08878013	1	2.2	0.522492423	6.2	0.08	0.62	0.84
Cadmium	2.8	0.0143	0.04004	0.053	0.201	0.010653	1.5	61	2	39	0.1377	0.2334015	1	2.2	0.129133864	2.3	0.06	0.23	0.56
Cobalt	99.2	0.0143	1.41856	0.06	0.201	0.01206	27.8	61	0.46	39	0.1377	2.35981998	1	2.2	1.722927264	20	0.09	5	0.34
Copper	29.1	0.0143	0.41613	0.08	0.201	0.01608	73	61	37.2	39	0.1377	8.1295326	1	2.2	3.891701182	35.4	0.11	24.3	0.16
Manganese	4710	0.0143	67.353	91.2	0.201	18.3312	17200	61	688	39	0.1377	1481.69606	1	2.2	712.4455745	268	**2.66**	83	**8.58**
Nickel	230	0.0143	3.289	1.38	0.201	0.27738	71	61	5	39	0.1377	6.232302	1	2.2	4.453946364	42.1	0.11	23.1	0.19
Selenium	5.2	0.0143	0.07436	0.0005	0.201	0.0001005	0.3	61	0.6	39	0.1377	0.0574209	1	2.2	0.059946091	0.25	0.24	0.025	**2.40**
Silver	0.215	0.0143	0.0030745	0.01	0.201	0.00201	3.6	61	0.88	39	0.1377	0.34964784	1	2.2	0.161241973	2.7	0.06	0.27	0.60
Uranium	3640	0.0143	52.052	0.727	0.201	0.146127	1177.04835	61	35.9	39	0.1377	100.796468	1	2.2	69.54299771	5	**13.91**	0.5	**139.09**
Vanadium	28.2	0.0143	0.40326	0.00051	0.201	0.00010251	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	598	0.0143	8.5514	3	0.201	0.603	115	61	183	39	0.1377	19.487304	1	2.2	13.01895636	225	0.06	22.5	0.58

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PC 30. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
Antimony	0.55	0.00184	0.001012	0.00025	0.057	0.00001425	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	11.4	0.00184	0.020976	0.0007	0.057	0.0000399	5	100	0.18216	0.9108	1	0.541	1.722395379	9.63	0.18	1.91	0.90
Barium	119	0.00184	0.21896	0.0165	0.057	0.0009405	74	100	0.18216	13.47984	1	0.541	25.32299538	51	0.50	5.1	**4.97**
Beryllium	4.2	0.00184	0.007728	0.0032	0.057	0.0001824	12.7	100	0.18216	2.313432	1	0.541	4.290836229	6.2	0.69	0.62	**6.92**
Cadmium	2.8	0.00184	0.005152	0.053	0.057	0.003021	1.5	100	0.18216	0.27324	1	0.541	0.520171904	2.3	0.23	0.23	**2.26**
Cobalt	99.2	0.00184	0.182528	0.06	0.057	0.00342	27.8	100	0.18216	5.064048	1	0.541	9.704243993	20	0.49	5	**1.94**
Copper	29.1	0.00184	0.053544	0.08	0.057	0.00456	73	100	0.18216	13.29768	1	0.541	24.68721627	35.4	0.70	24.3	**1.02**
Manganese	4710	0.00184	8.6664	91.2	0.057	5.1984	17200	100	0.18216	3133.152	1	0.541	5817.036599	268	**21.71**	83	**70.08**
Nickel	230	0.00184	0.4232	1.38	0.057	0.07866	71	100	0.18216	12.93336	1	0.541	24.83404806	42.1	0.59	23.1	**1.08**
Selenium	5.2	0.00184	0.009568	0.0005	0.057	0.0000285	0.3	100	0.18216	0.054648	1	0.541	0.118751386	0.25	0.48	0.025	**4.75**
Silver	0.215	0.00184	0.0003956	0.01	0.057	0.00057	3.6	100	0.18216	0.655776	1	0.541	1.213940111	2.7	0.45	0.27	**4.50**
Uranium	3640	0.00184	6.6976	0.727	0.057	0.041439	1177.04835	100	0.18216	214.41113	1	0.541	408.7803446	5	**81.76**	0.5	**817.56**
Vanadium	28.2	0.00184	0.051888	0.00051	0.057	0.00002907	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	598	0.00184	1.10032	3	0.057	0.171	115	100	0.18216	20.9484	1	0.541	41.07157116	225	0.18	22.5	**1.83**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 39. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.6	0.000687	0.0004122	0.0025	0.0665	0.00016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	12.8	0.000687	0.0087936	0.003	0.0665	0.0001995	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	79.9	0.000687	0.0548913	0.0206	0.0665	0.0013699	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	0.37	0.000687	0.00025419	0.00065	0.0665	0.000043225	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	0.12	0.000687	0.00008244	0.0005	0.0665	0.00003325	73	0.0365	100	0.408313	0.01490342	1	0.5	0.030038229	2.3	0.013	0.23	0.131
Cobalt	6.9	0.000687	0.0047403	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	11.3	0.000687	0.0077631	0.0086	0.0665	0.0005719	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	274	0.000687	0.188238	0.0183	0.0665	0.00121695	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	11.5	0.000687	0.0079005	0.0005	0.0665	0.00003325	61	0.0305	100	0.408313	0.01245355	1	0.5	0.040774593	42.1	0.001	23.1	0.002
Selenium	0.475	0.000687	0.000326325	0.002	0.0665	0.000133	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.24	0.000687	0.00016488	0.001	0.0665	0.0000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	2.6	0.000687	0.0017862	0.0005	0.0665	0.00003325	50	0.025	100	0.408313	0.01020783	1	0.5	0.02405455	5	0.005	0.5	0.048
Vanadium	25.1	0.000687	0.0172437	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	154	0.000687	0.105798	0.058	0.0665	0.003857	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 26. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.6	0.000576	0.0003456	0.0025	0.097	0.0002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	12.8	0.000576	0.0073728	0.003	0.097	0.000291	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	79.9	0.000576	0.0460224	0.0206	0.097	0.0019982	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	0.37	0.000576	0.00021312	0.00065	0.097	0.00006305	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	0.12	0.000576	0.00006912	0.0005	0.097	0.0000485	73	0.0365	100	0.342424	0.01249848	1	2.09	0.00603641	3.4	0.0018	0.85	0.007
Cobalt	6.9	0.000576	0.0039744	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	11.3	0.000576	0.0065088	0.0086	0.097	0.0008342	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	274	0.000576	0.157824	0.0183	0.097	0.0017751	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	11.5	0.000576	0.006624	0.0005	0.097	0.0000485	61	0.0305	100	0.342424	0.01044393	1	2.09	0.00818968	79	0.0001	57.2	0.000
Selenium	0.475	0.000576	0.0002736	0.002	0.097	0.000194	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.24	0.000576	0.00013824	0.001	0.097	0.000097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	2.6	0.000576	0.0014976	0.0005	0.097	0.0000485	50	0.025	100	0.342424	0.0085606	1	2.09	0.004835742	1,600	0.0000	160	0.000
Vanadium	25.1	0.000576	0.0144576	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	154	0.000576	0.088704	0.058	0.097	0.005626	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 26. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.6	0.000895	0.000537	0.0025	0.14	0.00035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	12.8	0.000895	0.011456	0.003	0.14	0.00042	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	79.9	0.000895	0.0715105	0.0206	0.14	0.002884	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	0.37	0.000895	0.00033115	0.00065	0.14	0.000091	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	0.12	0.000895	0.0001074	0.0005	0.14	0.00007	73	0.0365	100	0.532105	0.019421833	1	3.63	0.00539924	3.4	0.002	0.85	0.006
Cobalt	6.9	0.000895	0.0061755	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	11.3	0.000895	0.0101135	0.0086	0.14	0.001204	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	274	0.000895	0.24523	0.0183	0.14	0.002562	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	11.5	0.000895	0.0102925	0.0005	0.14	0.00007	61	0.0305	100	0.532105	0.016229203	1	3.63	0.00732554	79	0.000	57.2	0.000
Selenium	0.475	0.000895	0.000425125	0.002	0.14	0.00028	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.24	0.000895	0.0002148	0.001	0.14	0.00014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	2.6	0.000895	0.002327	0.0005	0.14	0.00007	50	0.025	100	0.532105	0.013302625	1	3.63	0.00432497	1,600	0.000	160	0.000
Vanadium	25.1	0.000895	0.0224645	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	154	0.000895	0.13783	0.058	0.14	0.00812	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 34. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
Antimony	0.6	0.0442	0.02652	0.0025	0.04	0.0001	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	12.8	0.0442	0.56576	0.003	0.04	0.00012	2	21	8	79	0.0392	0.264208	1	0.55	1.50925091	22.8	0.07	5.7	0.26
Barium	79.9	0.0442	3.53158	0.0206	0.04	0.000824	38.5	21	250	79	0.0392	8.058932	1	0.55	21.0751564	416.5	0.05	208.3	0.10
Beryllium	0.37	0.0442	0.016354	0.00065	0.04	0.000026	0.85	21	4.8	79	0.0392	0.1556436	1	0.55	0.31277018	NS	N/A	NS	N/A
Cadmium	0.12	0.0442	0.005304	0.0005	0.04	0.00002	2.3	21	12.9	79	0.0392	0.4184208	1	0.55	0.77044509	3.4	0.23	0.85	0.91
Cobalt	6.9	0.0442	0.30498	0.0005	0.04	0.00002	2.3	21	11.3	79	0.0392	0.368872	1	0.55	1.22522182	43.9	0.03	23.1	0.05
Copper	11.3	0.0442	0.49946	0.0086	0.04	0.000344	20	21	36	79	0.0392	1.279488	1	0.55	3.23507636	33.2	0.10	26.9	0.12
Manganese	274	0.0442	12.1108	0.0183	0.04	0.000732	4120	21	38800	79	0.0392	1235.47424	1	0.55	2268.33777	9770	0.23	977	**2.32**
Nickel	11.5	0.0442	0.5083	0.0005	0.04	0.00002	19	21	140	79	0.0392	4.491928	1	0.55	9.09136	79	0.12	57.2	0.16
Selenium	0.475	0.0442	0.020995	0.002	0.04	0.00008	0.4	21	0.5	79	0.0392	0.0187768	1	0.55	0.07245782	0.8	0.09	0.4	0.18
Silver	0.24	0.0442	0.010608	0.001	0.04	0.00004	0.25	21	0.5	79	0.0392	0.017542	1	0.55	0.05125455	39.7	0.00	3.97	0.01
Uranium	2.6	0.0442	0.11492	0.0005	0.04	0.00002	30.8	21	108.657194	79	0.0392	3.618441584	1	0.55	6.78796652	1,600	0.00	160	0.04
Vanadium	25.1	0.0442	1.10942	0.0005	0.04	0.00002	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	154	0.0442	6.8068	0.058	0.04	0.00232	170	21	340	79	0.0392	11.92856	1	0.55	34.0685091	224	0.15	10.5	**3.24**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 34. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0143	0.00858	0.0025	0.201	0.0005025	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	12.8	0.0143	0.18304	0.003	0.201	0.000603	8	61	2	39	0.1377	0.779382	1	2.2	0.437738636	9.63	0.05	1.91	0.23
Barium	79.9	0.0143	1.14257	0.0206	0.201	0.0041406	250	61	38.5	39	0.1377	23.0668155	1	2.2	11.00614823	51	0.22	5.1	**2.16**
Beryllium	0.37	0.0143	0.005291	0.00065	0.201	0.00013065	4.8	61	0.85	39	0.1377	0.44883315	1	2.2	0.206479455	6.2	0.03	0.62	0.33
Cadmium	0.12	0.0143	0.001716	0.0005	0.201	0.0001005	12.9	61	2.3	39	0.1377	1.2070782	1	2.2	0.549497591	2.3	0.24	0.23	**2.39**
Cobalt	6.9	0.0143	0.09867	0.0005	0.201	0.0001005	11.3	61	2.3	39	0.1377	1.072683	1	2.2	0.532478864	20	0.03	5	0.11
Copper	11.3	0.0143	0.16159	0.0086	0.201	0.0017286	36	61	20	39	0.1377	4.097952	1	2.2	1.936941182	35.4	0.05	24.3	0.08
Manganese	274	0.0143	3.9182	0.0183	0.201	0.0036783	38800	61	4120	39	0.1377	3480.33996	1	2.2	1583.755381	268	**5.91**	83	**19.08**
Nickel	11.5	0.0143	0.16445	0.0005	0.201	0.0001005	140	61	19	39	0.1377	12.779937	1	2.2	5.883857955	42.1	0.14	23.1	0.25
Selenium	0.475	0.0143	0.0067925	0.002	0.201	0.000402	0.5	61	0.4	39	0.1377	0.0634797	1	2.2	0.032124636	0.25	0.13	0.025	**1.28**
Silver	0.24	0.0143	0.003432	0.001	0.201	0.000201	0.5	61	0.25	39	0.1377	0.05542425	1	2.2	0.026844205	2.7	0.01	0.27	0.10
Uranium	2.6	0.0143	0.03718	0.0005	0.201	0.0001005	108.66	61	30.8	39	0.1377	10.7809307	1	2.2	4.917368738	5	0.98	0.5	**9.83**
Vanadium	25.1	0.0143	0.35893	0.0005	0.201	0.0001005	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	154	0.0143	2.2022	0.058	0.201	0.011658	340	61	170	39	0.1377	37.68849	1	2.2	18.13743091	225	0.08	22.5	0.81

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 36. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
Antimony	0.6	0.00184	0.001104	0.0025	0.057	0.0001425	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	12.8	0.00184	0.023552	0.003	0.057	0.000171	8	100	0.18216	1.45728	1	0.541	2.737528651	9.63	0.28	1.91	**1.43**
Barium	79.9	0.00184	0.147016	0.0206	0.057	0.0011742	250	100	0.18216	45.54	1	0.541	84.45136821	51	**1.66**	5.1	**16.56**
Beryllium	0.37	0.00184	0.0006808	0.00065	0.057	0.00003705	4.8	100	0.18216	0.874368	1	0.541	1.617533919	6.2	0.26	0.62	**2.61**
Cadmium	0.12	0.00184	0.0002208	0.0005	0.057	0.0000285	12.9	100	0.18216	2.349864	1	0.541	4.34401719	2.3	**1.89**	0.23	**18.89**
Cobalt	6.9	0.00184	0.012696	0.0005	0.057	0.0000285	11.3	100	0.18216	2.058408	1	0.541	3.828341035	20	0.19	5	0.77
Copper	11.3	0.00184	0.020792	0.0086	0.057	0.0004902	36	100	0.18216	6.55776	1	0.541	12.16089131	35.4	0.34	24.3	0.50
Manganese	274	0.00184	0.50416	0.0183	0.057	0.0010431	38800	100	0.18216	7067.808	1	0.541	13065.27394	268	**48.75**	83	**157.41**
Nickel	11.5	0.00184	0.02116	0.0005	0.057	0.0000285	140	100	0.18216	25.5024	1	0.541	47.17853697	42.1	**1.12**	23.1	**2.04**
Selenium	0.475	0.00184	0.000874	0.002	0.057	0.000114	0.5	100	0.18216	0.09108	1	0.541	0.170181146	0.25	0.68	0.025	**6.81**
Silver	0.24	0.00184	0.0004416	0.001	0.057	0.000057	0.5	100	0.18216	0.09108	1	0.541	0.169276525	2.7	0.06	0.27	0.63
Uranium	2.6	0.00184	0.004784	0.0005	0.057	0.0000285	108.657194	100	0.18216	19.792994	1	0.541	36.59483726	5	**7.32**	0.5	**73.19**
Vanadium	25.1	0.00184	0.046184	0.0005	0.057	0.0000285	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	154	0.00184	0.28336	0.058	0.057	0.003306	340	100	0.18216	61.9344	1	0.541	115.0112126	225	0.51	22.5	**5.11**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available
ND: Not defined; database insufficient to derive values

TABLE PH 38. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000687	0.00044655	0.0086	0.0665	0.0005719	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	11.9	0.000687	0.0081753	0.0019	0.0665	0.00012635	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	138	0.000687	0.094806	0.0616	0.0665	0.0040964	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	1.4	0.000687	0.0009618	0.00005	0.0665	0.000003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	1	0.000687	0.000687	0.0018	0.0665	0.0001197	73	0.1314	100	0.408313	0.05365233	1	0.5	0.108918056	2.3	0.047	0.23	0.474
Cobalt	16.5	0.000687	0.0113355	0.002	0.0665	0.000133	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	16.2	0.000687	0.0111294	0.0141	0.0665	0.00093765	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	3670	0.000687	2.52129	0.0903	0.0665	0.00600495	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	51.4	0.000687	0.0353118	0.0083	0.0665	0.00055195	61	0.5063	100	0.408313	0.20672887	1	0.5	0.485185244	42.1	0.012	23.1	0.021
Selenium	0.55	0.000687	0.00037785	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.265	0.000687	0.000182055	0.00035	0.0665	0.000023275	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	28.6	0.000687	0.0196482	0.027	0.0665	0.0017955	50	1.35	100	0.408313	0.55122255	1	0.5	1.1453325	5	0.229	0.5	**2.291**
Vanadium	23.3	0.000687	0.0160071	0.0048	0.0665	0.0003192	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	118	0.000687	0.081066	0.0522	0.0665	0.0034713	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
BAF:	Bioaccumulation factor
ND:	Not defined; database insufficient to derive values
N/A:	Value could not be calculated with the information available

TABLE PQ 25. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.65	0.000576	0.0003744	0.0086	0.097	0.0008342	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	11.9	0.000576	0.0068544	0.0019	0.097	0.0001843	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	138	0.000576	0.079488	0.0616	0.097	0.0059752	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	1.4	0.000576	0.0008064	0.00005	0.097	0.00000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	1	0.000576	0.000576	0.0018	0.097	0.0001746	73	0.1314	100	0.342424	0.04499451	1	2.09	0.021887614	3.4	0.0064	0.85	0.026
Cobalt	16.5	0.000576	0.009504	0.002	0.097	0.000194	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	16.2	0.000576	0.0093312	0.0141	0.097	0.0013677	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	3670	0.000576	2.11392	0.0903	0.097	0.0087591	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	51.4	0.000576	0.0296064	0.0083	0.097	0.0008051	61	0.5063	100	0.342424	0.17336927	1	2.09	0.097502761	79	0.0012	57.2	0.002
Selenium	0.55	0.000576	0.0003168	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.265	0.000576	0.00015264	0.00035	0.097	0.00003395	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	28.6	0.000576	0.0164736	0.027	0.097	0.002619	50	1.35	100	0.342424	0.4622724	1	2.09	0.230318182	1,600	0.0001	160	0.001
Vanadium	23.3	0.000576	0.0134208	0.0048	0.097	0.0004656	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	118	0.000576	0.067968	0.0522	0.097	0.0050634	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 25. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.65	0.000895	0.00058175	0.0086	0.14	0.001204	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	11.9	0.000895	0.0106505	0.0019	0.14	0.000266	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	138	0.000895	0.12351	0.0616	0.14	0.008624	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	1.4	0.000895	0.001253	0.00005	0.14	0.000007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	1	0.000895	0.000895	0.0018	0.14	0.000252	73	0.1314	100	0.532105	0.069918597	1	3.63	0.0195773	3.4	0.006	0.85	0.023
Cobalt	16.5	0.000895	0.0147675	0.002	0.14	0.00028	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	16.2	0.000895	0.014499	0.0141	0.14	0.001974	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	3670	0.000895	3.28465	0.0903	0.14	0.012642	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	51.4	0.000895	0.046003	0.0083	0.14	0.001162	61	0.5063	100	0.532105	0.269404762	1	3.63	0.0872093	79	0.001	57.2	0.002
Selenium	0.55	0.000895	0.00049225	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.265	0.000895	0.000237175	0.00035	0.14	0.000049	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	28.6	0.000895	0.025597	0.027	0.14	0.00378	50	1.35	100	0.532105	0.71834175	1	3.63	0.20598313	1,600	0.000	160	0.001
Vanadium	23.3	0.000895	0.0208535	0.0048	0.14	0.000672	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	118	0.000895	0.10561	0.0522	0.14	0.007308	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 33. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
Antimony	0.65	0.0442	0.02873	0.0086	0.04	0.000344	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	11.9	0.0442	0.52598	0.0019	0.04	0.000076	2	21	8	79	0.0392	0.264208	1	0.55	1.43684364	22.8	0.06	5.7	0.25
Barium	138	0.0442	6.0996	0.0616	0.04	0.002464	38.5	21	250	79	0.0392	8.058932	1	0.55	25.7472655	416.5	0.06	208.3	0.12
Beryllium	1.4	0.0442	0.06188	0.00005	0.04	0.000002	0.85	21	4.8	79	0.0392	0.1556436	1	0.55	0.39550109	NS	N/A	NS	N/A
Cadmium	1	0.0442	0.0442	0.0018	0.04	0.000072	2.3	21	12.9	79	0.0392	0.4184208	1	0.55	0.84125964	3.4	0.25	0.85	0.99
Cobalt	16.5	0.0442	0.7293	0.002	0.04	0.00008	2.3	21	11.3	79	0.0392	0.368872	1	0.55	1.99682182	43.9	0.05	23.1	0.09
Copper	16.2	0.0442	0.71604	0.0141	0.04	0.000564	20	21	36	79	0.0392	1.279488	1	0.55	3.62925818	33.2	0.11	26.9	0.13
Manganese	3670	0.0442	162.214	0.0903	0.04	0.003612	4120	21	38800	79	0.0392	1235.47424	1	0.55	2541.25791	9770	0.26	977	**2.60**
Nickel	51.4	0.0442	2.27188	0.0083	0.04	0.000332	19	21	140	79	0.0392	4.491928	1	0.55	12.2984364	79	0.16	57.2	0.22
Selenium	0.55	0.0442	0.02431	0.0005	0.04	0.00002	0.4	21	0.5	79	0.0392	0.0187768	1	0.55	0.078376	0.8	0.10	0.4	0.20
Silver	0.265	0.0442	0.011713	0.00035	0.04	0.000014	0.25	21	0.5	79	0.0392	0.017542	1	0.55	0.05321636	39.7	0.00	3.97	0.01
Uranium	28.6	0.0442	1.26412	0.027	0.04	0.00108	30.8	21	108.657194	79	0.0392	3.618441584	1	0.55	8.87934833	1,600	0.01	160	0.06
Vanadium	23.3	0.0442	1.02986	0.0048	0.04	0.000192	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	118	0.0442	5.2156	0.0522	0.04	0.002088	170	21	340	79	0.0392	11.92856	1	0.55	31.1749964	224	0.14	10.5	**2.97**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 33. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0143	0.009295	0.0086	0.201	0.0017286	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	11.9	0.0143	0.17017	0.0019	0.201	0.0003819	8	61	2	39	0.1377	0.779382	1	2.2	0.431788136	9.63	0.04	1.91	0.23
Barium	138	0.0143	1.9734	0.0616	0.201	0.0123816	250	61	38.5	39	0.1377	23.0668155	1	2.2	11.38754414	51	0.22	5.1	**2.23**
Beryllium	1.4	0.0143	0.02002	0.00005	0.201	0.00001005	4.8	61	0.85	39	0.1377	0.44883315	1	2.2	0.213119636	6.2	0.03	0.62	0.34
Cadmium	1	0.0143	0.0143	0.0018	0.201	0.0003618	12.9	61	2.3	39	0.1377	1.2070782	1	2.2	0.555336364	2.3	0.24	0.23	**2.41**
Cobalt	16.5	0.0143	0.23595	0.002	0.201	0.000402	11.3	61	2.3	39	0.1377	1.072683	1	2.2	0.595015909	20	0.03	5	0.12
Copper	16.2	0.0143	0.23166	0.0141	0.201	0.0028341	36	61	20	39	0.1377	4.097952	1	2.2	1.969293682	35.4	0.06	24.3	0.08
Manganese	3670	0.0143	52.481	0.0903	0.201	0.0181503	38800	61	4120	39	0.1377	3480.33996	1	2.2	1605.835959	268	**5.99**	83	**19.35**
Nickel	51.4	0.0143	0.73502	0.0083	0.201	0.0016683	140	61	19	39	0.1377	12.779937	1	2.2	6.143920591	42.1	0.15	23.1	0.27
Selenium	0.55	0.0143	0.007865	0.0005	0.201	0.0001005	0.5	61	0.4	39	0.1377	0.0634797	1	2.2	0.032475091	0.25	0.13	0.025	**1.30**
Silver	0.265	0.0143	0.0037895	0.00035	0.201	0.00007035	0.5	61	0.25	39	0.1377	0.05542425	1	2.2	0.026947318	2.7	0.01	0.27	0.10
Uranium	28.6	0.0143	0.40898	0.027	0.201	0.005427	108.657194	61	30.8	39	0.1377	10.7809307	1	2.2	5.088789875	5	**1.02**	0.5	**10.18**
Vanadium	23.3	0.0143	0.33319	0.0048	0.201	0.0009648	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	118	0.0143	1.6874	0.0522	0.201	0.0104922	340	61	170	39	0.1377	37.68849	1	2.2	17.902901	225	0.08	22.5	0.80

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 35. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
Antimony	0.65	0.00184	0.001196	0.0086	0.057	0.0004902	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	11.9	0.00184	0.021896	0.0019	0.057	0.0001083	8	100	0.18216	1.45728	1	0.541	2.734351756	9.63	0.28	1.91	**1.43**
Barium	138	0.00184	0.25392	0.0616	0.057	0.0035112	250	100	0.18216	45.54	1	0.541	84.65329242	51	**1.66**	5.1	**16.60**
Beryllium	1.4	0.00184	0.002576	0.00005	0.057	0.00000285	4.8	100	0.18216	0.874368	1	0.541	1.620973845	6.2	0.26	0.62	**2.61**
Cadmium	1	0.00184	0.00184	0.0018	0.057	0.0001026	12.9	100	0.18216	2.349864	1	0.541	4.347147135	2.3	**1.89**	0.23	**18.90**
Cobalt	16.5	0.00184	0.03036	0.002	0.057	0.000114	11.3	100	0.18216	2.058408	1	0.541	3.861149723	20	0.19	5	0.77
Copper	16.2	0.00184	0.029808	0.0141	0.057	0.0008037	36	100	0.18216	6.55776	1	0.541	12.17813623	35.4	0.34	24.3	0.50
Manganese	3670	0.00184	6.7528	0.0903	0.057	0.0051471	38800	100	0.18216	7067.808	1	0.541	13076.8317	268	**48.79**	83	**157.55**
Nickel	51.4	0.00184	0.094576	0.0083	0.057	0.0004731	140	100	0.18216	25.5024	1	0.541	47.31506303	42.1	**1.12**	23.1	**2.05**
Selenium	0.55	0.00184	0.001012	0.0005	0.057	0.0000285	0.5	100	0.18216	0.09108	1	0.541	0.170278189	0.25	0.68	0.025	**6.81**
Silver	0.265	0.00184	0.0004876	0.00035	0.057	0.00001995	0.5	100	0.18216	0.09108	1	0.541	0.169293068	2.7	0.06	0.27	0.63
Uranium	28.6	0.00184	0.052624	0.027	0.057	0.001539	108.66	100	0.18216	19.792994	1	0.541	36.68605815	5	**7.34**	0.5	**73.37**
Vanadium	23.3	0.00184	0.042872	0.0048	0.057	0.0002736	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	118	0.00184	0.21712	0.0522	0.057	0.0029754	340	100	0.18216	61.9344	1	0.541	114.8881616	225	0.51	22.5	**5.11**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 35. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Eastern Drainage, Instream Sediment
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	1.2	0.000687	0.0008244	0.0022	0.0665	0.0001463	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	14.7	0.000687	0.0100989	0.002	0.0665	0.000133	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	254	0.000687	0.174498	0.077	0.0665	0.0051205	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	3.8	0.000687	0.0026106	0.00005	0.0665	0.000003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	9.6	0.000687	0.0065952	0.0026	0.0665	0.0001729	73	0.1898	100	0.408313	0.07749781	1	0.5	0.168531815	2.3	0.073	0.23	0.733
Cobalt	35.9	0.000687	0.0246633	0.0014	0.0665	0.0000931	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	29.8	0.000687	0.0204726	0.047	0.0665	0.0031255	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	24300	0.000687	16.6941	4.74	0.0665	0.31521	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	309	0.000687	0.212283	0.11	0.0665	0.007315	61	6.71	100	0.408313	2.73978023	1	0.5	5.91875646	42.1	0.141	23.1	0.256
Selenium	16	0.000687	0.010992	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.1	0.000687	0.0000687	0.01	0.0665	0.000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	83.8	0.000687	0.0575706	0.078	0.0665	0.005187	50	3.9	100	0.408313	1.5924207	1	0.5	3.3103566	5	0.662	0.5	**6.621**
Vanadium	33.8	0.000687	0.0232206	0.00058	0.0665	0.00003857	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	395	0.000687	0.271365	0.1	0.0665	0.00665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 22. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	1.2	0.000576	0.0006912	0.0022	0.097	0.0002134	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	14.7	0.000576	0.0084672	0.002	0.097	0.000194	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	254	0.000576	0.146304	0.077	0.097	0.007469	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	3.8	0.000576	0.0021888	0.00005	0.097	0.00000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	9.6	0.000576	0.0055296	0.0026	0.097	0.0002522	73	0.1898	100	0.342424	0.06499208	1	2.09	0.033863098	3.4	0.0100	0.85	0.040
Cobalt	35.9	0.000576	0.0206784	0.0014	0.097	0.0001358	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	29.8	0.000576	0.0171648	0.047	0.097	0.004559	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	24300	0.000576	13.9968	4.74	0.097	0.45978	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	309	0.000576	0.177984	0.11	0.097	0.01067	61	6.71	100	0.342424	2.29766504	1	2.09	1.189626335	79	0.0151	57.2	0.021
Selenium	16	0.000576	0.009216	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.1	0.000576	0.0000576	0.01	0.097	0.00097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	83.8	0.000576	0.0482688	0.078	0.097	0.007566	50	3.9	100	0.342424	1.3354536	1	2.09	0.66568823	1,600	0.0004	160	0.004
Vanadium	33.8	0.000576	0.0194688	0.00058	0.097	0.00005626	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	395	0.000576	0.22752	0.1	0.097	0.0097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 22. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.000895	0.001074	0.0022	0.14	0.000308	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	14.7	0.000895	0.0131565	0.002	0.14	0.00028	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	254	0.000895	0.22733	0.077	0.14	0.01078	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	3.8	0.000895	0.003401	0.00005	0.14	0.000007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	9.6	0.000895	0.008592	0.0026	0.14	0.000364	73	0.1898	100	0.532105	0.100993529	1	3.63	0.03028913	3.4	0.009	0.85	0.036
Cobalt	35.9	0.000895	0.0321305	0.0014	0.14	0.000196	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	29.8	0.000895	0.026671	0.047	0.14	0.00658	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	24300	0.000895	21.7485	4.74	0.14	0.6636	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	309	0.000895	0.276555	0.11	0.14	0.0154	61	6.71	100	0.532105	3.57042455	1	3.63	1.0640164	79	0.013	57.2	0.019
Selenium	16	0.000895	0.01432	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.1	0.000895	0.0000895	0.01	0.14	0.0014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	83.8	0.000895	0.075001	0.078	0.14	0.01092	50	3.9	100	0.532105	2.0752095	1	3.63	0.59535275	1,600	0.000	160	0.004
Vanadium	33.8	0.000895	0.030251	0.00058	0.14	0.0000812	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	395	0.000895	0.353525	0.1	0.14	0.014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 30. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
Antimony	1.2	0.0442	0.05304	0.0022	0.04	0.000088	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	14.7	0.0442	0.64974	0.002	0.04	0.00008	4.7	21	3	79	0.0392	0.1315944	1	0.55	1.42075345	22.8	0.06	5.7	0.25
Barium	254	0.0442	11.2268	0.077	0.04	0.00308	43	21	75	79	0.0392	2.676576	1	0.55	25.2844655	416.5	0.06	208.3	0.12
Beryllium	3.8	0.0442	0.16796	0.00005	0.04	0.000002	0.52	21	3	79	0.0392	0.09718464	1	0.55	0.4820848	NS	N/A	NS	N/A
Cadmium	9.6	0.0442	0.42432	0.0026	0.04	0.000104	8.5	21	3.8	79	0.0392	0.1876504	1	0.55	1.11286255	3.4	0.33	0.85	**1.31**
Cobalt	35.9	0.0442	1.58678	0.0014	0.04	0.000056	9.69	21	10.3	79	0.0392	0.39873848	1	0.55	3.61013542	43.9	0.08	23.1	0.16
Copper	29.8	0.0442	1.31716	0.047	0.04	0.00188	15.5	21	30	79	0.0392	1.056636	1	0.55	4.31941091	33.2	0.13	26.9	0.16
Manganese	24300	0.0442	1074.06	4.74	0.04	0.1896	1640	21	8820	79	0.0392	286.63824	1	0.55	2474.34153	9770	0.25	977	**2.53**
Nickel	309	0.0442	13.6578	0.11	0.04	0.0044	18	21	66	79	0.0392	2.192064	1	0.55	28.8259345	79	0.36	57.2	0.50
Selenium	16	0.0442	0.7072	0.0005	0.04	0.00002	7.8	21	0.3	79	0.0392	0.0735	1	0.55	1.41949091	0.8	**1.77**	0.4	**3.55**
Silver	0.1	0.0442	0.00442	0.01	0.04	0.0004	0.78	21	0.1	79	0.0392	0.00951776	1	0.55	0.02606865	39.7	0.00	3.97	0.01
Uranium	83.8	0.0442	3.70396	0.078	0.04	0.00312	20.8	21	121.030172	79	0.0392	3.919287966	1	0.55	13.8661236	1,600	0.01	160	0.09
Vanadium	33.8	0.0442	1.49396	0.00058	0.04	0.0000232	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	395	0.0442	17.459	0.1	0.04	0.004	132	21	163	79	0.0392	6.134408	1	0.55	42.9043782	224	0.19	10.5	**4.09**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 30. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.0143	0.01716	0.0022	0.201	0.0004422	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	14.7	0.0143	0.21021	0.002	0.201	0.000402	3	61	4.7	39	0.1377	0.5043951	1	2.2	0.325003227	9.63	0.03	1.91	0.17
Barium	254	0.0143	3.6322	0.077	0.201	0.015477	75	61	43	39	0.1377	8.609004	1	2.2	5.571218636	51	0.11	5.1	**1.09**
Beryllium	3.8	0.0143	0.05434	0.00005	0.201	0.00001005	3	61	0.52	39	0.1377	0.27991656	1	2.2	0.151939368	6.2	0.02	0.62	0.25
Cadmium	9.6	0.0143	0.13728	0.0026	0.201	0.0005226	3.8	61	8.5	39	0.1377	0.7756641	1	2.2	0.415212136	2.3	0.18	0.23	**1.81**
Cobalt	35.9	0.0143	0.51337	0.0014	0.201	0.0002814	10.3	61	9.69	39	0.1377	1.38555117	1	2.2	0.863273895	20	0.04	5	0.17
Copper	29.8	0.0143	0.42614	0.047	0.201	0.009447	30	61	15.5	39	0.1377	3.3523065	1	2.2	1.721769773	35.4	0.05	24.3	0.07
Manganese	24300	0.0143	347.49	4.74	0.201	0.95274	8820	61	1640	39	0.1377	828.92646	1	2.2	535.1678182	268	**2.00**	83	**6.45**
Nickel	309	0.0143	4.4187	0.11	0.201	0.02211	66	61	18	39	0.1377	6.510456	1	2.2	4.977848182	42.1	0.12	23.1	0.22
Selenium	16	0.0143	0.2288	0.0005	0.201	0.0001005	0.3	61	7.8	39	0.1377	0.4440825	1	2.2	0.305901364	0.25	**1.22**	0.025	**12.24**
Silver	0.1	0.0143	0.00143	0.01	0.201	0.00201	0.1	61	0.78	39	0.1377	0.05028804	1	2.2	0.024421836	2.7	0.01	0.27	0.09
Uranium	83.8	0.0143	1.19834	0.078	0.201	0.015678	121.030172	61	20.8	39	0.1377	11.2831938	1	2.2	5.680550799	5	**1.14**	0.5	**11.36**
Vanadium	33.8	0.0143	0.48334	0.00058	0.201	0.00011658	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	395	0.0143	5.6485	0.1	0.201	0.0201	163	61	132	39	0.1377	20.780307	1	2.2	12.02223045	225	0.05	22.5	0.53

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 32. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
Antimony	1.2	0.00184	0.002208	0.0022	0.057	0.0001254	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	14.7	0.00184	0.027048	0.002	0.057	0.000114	3	100	0.18216	0.54648	1	0.541	1.060336414	9.63	0.11	1.91	0.56
Barium	254	0.00184	0.46736	0.077	0.057	0.004389	75	100	0.18216	13.662	1	0.541	26.12522921	51	0.51	5.1	**5.12**
Beryllium	3.8	0.00184	0.006992	0.00005	0.057	0.00000285	3	100	0.18216	0.54648	1	0.541	1.023058872	6.2	0.17	0.62	**1.65**
Cadmium	9.6	0.00184	0.017664	0.0026	0.057	0.0001482	3.8	100	0.18216	0.692208	1	0.541	1.312421811	2.3	0.57	0.23	**5.71**
Cobalt	35.9	0.00184	0.066056	0.0014	0.057	0.0000798	10.3	100	0.18216	1.876248	1	0.541	3.590358226	20	0.18	5	0.72
Copper	29.8	0.00184	0.054832	0.047	0.057	0.002679	30	100	0.18216	5.4648	1	0.541	10.20759889	35.4	0.29	24.3	0.42
Manganese	24300	0.00184	44.712	4.74	0.057	0.27018	8820	100	0.18216	1606.6512	1	0.541	3052.926765	268	**11.39**	83	**36.78**
Nickel	309	0.00184	0.56856	0.11	0.057	0.00627	66	100	0.18216	12.02256	1	0.541	23.28537893	42.1	0.55	23.1	**1.01**
Selenium	16	0.00184	0.02944	0.0005	0.057	0.0000285	0.3	100	0.18216	0.054648	1	0.541	0.155483364	0.25	0.62	0.025	**6.22**
Silver	0.1	0.00184	0.000184	0.01	0.057	0.00057	0.1	100	0.18216	0.018216	1	0.541	0.035064695	2.7	0.01	0.27	0.13
Uranium	83.8	0.00184	0.154192	0.078	0.057	0.004446	121.030172	100	0.18216	22.046856	1	0.541	41.04527566	5	**8.21**	0.5	**82.09**
Vanadium	33.8	0.00184	0.062192	0.00058	0.057	0.00003306	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	395	0.00184	0.7268	0.1	0.057	0.0057	163	100	0.18216	29.69208	1	0.541	56.23767098	225	0.25	22.5	**2.50**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 37. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.6	0.000687	0.0004122	0.0073	0.0665	0.00048545	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	80	0.000687	0.05496	0.0018	0.0665	0.0001197	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	663	0.000687	0.455481	0.054	0.0665	0.003591	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	2.68	0.000687	0.00184116	0.00005	0.0665	0.000003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	9.6	0.000687	0.0065952	0.0024	0.0665	0.0001596	73	0.1752	100	0.408313	0.07153644	1	0.5	0.156582475	2.3	0.068	0.23	0.681
Cobalt	139	0.000687	0.095493	0.00025	0.0665	0.000016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	20	0.000687	0.01374	0.04	0.0665	0.00266	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	63300	0.000687	43.4871	1.07	0.0665	0.071155	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	460	0.000687	0.31602	0.02	0.0665	0.00133	61	1.22	100	0.408313	0.49814186	1	0.5	1.63098372	42.1	0.039	23.1	0.071
Selenium	1.4	0.000687	0.0009618	0.0046	0.0665	0.0003059	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.09	0.000687	0.00006183	0.01	0.0665	0.000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	47	0.000687	0.032289	0.1	0.0665	0.00665	50	5	100	0.408313	2.041565	1	0.5	4.161008	5	0.832	0.5	**8.322**
Vanadium	25.9	0.000687	0.0177933	0.0049	0.0665	0.00032585	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	520	0.000687	0.35724	0.07	0.0665	0.004655	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 24. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.6	0.000576	0.0003456	0.0073	0.097	0.0007081	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	80	0.000576	0.04608	0.0018	0.097	0.0001746	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	663	0.000576	0.381888	0.054	0.097	0.005238	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	2.68	0.000576	0.00154368	0.00005	0.097	0.00000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	9.6	0.000576	0.0055296	0.0024	0.097	0.0002328	73	0.1752	100	0.342424	0.05999268	1	2.09	0.031461763	3.4	0.0093	0.85	0.037
Cobalt	139	0.000576	0.080064	0.00025	0.097	0.00002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	20	0.000576	0.01152	0.04	0.097	0.00388	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	63300	0.000576	36.4608	1.07	0.097	0.10379	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	460	0.000576	0.26496	0.02	0.097	0.00194	61	1.22	100	0.342424	0.41775728	1	2.09	0.327587215	79	0.0041	57.2	0.006
Selenium	1.4	0.000576	0.0008064	0.0046	0.097	0.0004462	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.09	0.000576	0.00005184	0.01	0.097	0.00097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	47	0.000576	0.027072	0.1	0.097	0.0097	50	5	100	0.342424	1.71212	1	2.09	0.836790431	1,600	0.0005	160	0.005
Vanadium	25.9	0.000576	0.0149184	0.0049	0.097	0.0004753	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	520	0.000576	0.29952	0.07	0.097	0.00679	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 24. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000895	0.000537	0.0073	0.14	0.001022	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	80	0.000895	0.0716	0.0018	0.14	0.000252	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	663	0.000895	0.593385	0.054	0.14	0.00756	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	2.68	0.000895	0.0023986	0.00005	0.14	0.000007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	9.6	0.000895	0.008592	0.0024	0.14	0.000336	73	0.1752	100	0.532105	0.093224796	1	3.63	0.02814127	3.4	0.008	0.85	0.033
Cobalt	139	0.000895	0.124405	0.00025	0.14	0.000035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	20	0.000895	0.0179	0.04	0.14	0.0056	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	63300	0.000895	56.6535	1.07	0.14	0.1498	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	460	0.000895	0.4117	0.02	0.14	0.0028	61	1.22	100	0.532105	0.6491681	1	3.63	0.29302152	79	0.004	57.2	0.005
Selenium	1.4	0.000895	0.001253	0.0046	0.14	0.000644	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.09	0.000895	0.00008055	0.01	0.14	0.0014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	47	0.000895	0.042065	0.1	0.14	0.014	50	5	100	0.532105	2.660525	1	3.63	0.7483719	1,600	0.000	160	0.005
Vanadium	25.9	0.000895	0.0231805	0.0049	0.14	0.000686	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	520	0.000895	0.4654	0.07	0.14	0.0098	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 32. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0442	0.02652	0.0073	0.04	0.000292	0	21	0	79	0.0392	0	1	0.55	0.04874909	NS	N/A	NS	N/A
Arsenic	80	0.0442	3.536	0.0018	0.04	0.000072	2	21	8	79	0.0392	0.264208	1	0.55	6.9096	22.8	0.30	5.7	**1.21**
Barium	663	0.0442	29.3046	0.054	0.04	0.00216	38.5	21	250	79	0.0392	8.058932	1	0.55	67.9376218	416.5	0.16	208.3	0.33
Beryllium	2.68	0.0442	0.118456	0.00005	0.04	0.000002	0.85	21	4.8	79	0.0392	0.1556436	1	0.55	0.49836655	NS	N/A	NS	N/A
Cadmium	9.6	0.0442	0.42432	0.0024	0.04	0.000096	2.3	21	12.9	79	0.0392	0.4184208	1	0.55	1.53243055	3.4	0.45	0.85	**1.80**
Cobalt	139	0.0442	6.1438	0.00025	0.04	0.00001	2.3	21	11.3	79	0.0392	0.368872	1	0.55	11.84124	43.9	0.27	23.1	0.51
Copper	20	0.0442	0.884	0.04	0.04	0.0016	20	21	36	79	0.0392	1.279488	1	0.55	3.93652364	33.2	0.12	26.9	0.15
Manganese	63300	0.0442	2797.86	1.07	0.04	0.0428	4120	21	38800	79	0.0392	1235.47424	1	0.55	7333.4128	9770	0.75	977	**7.51**
Nickel	460	0.0442	20.332	0.02	0.04	0.0008	19	21	140	79	0.0392	4.491928	1	0.55	45.1358691	79	0.57	57.2	0.79
Selenium	1.4	0.0442	0.06188	0.0046	0.04	0.000184	0.4	21	0.5	79	0.0392	0.0187768	1	0.55	0.14698327	0.8	0.18	0.4	0.37
Silver	0.09	0.0442	0.003978	0.01	0.04	0.0004	0.25	21	0.5	79	0.0392	0.017542	1	0.55	0.03985455	39.7	0.00	3.97	0.01
Uranium	47	0.0442	2.0774	0.1	0.04	0.004	30.8	21	108.657194	79	0.0392	3.618441584	1	0.55	10.3633483	1,600	0.01	160	0.06
Vanadium	25.9	0.0442	1.14478	0.0049	0.04	0.000196	0	21	0	79	0.0392	0	1	0.55	2.08177455	114	0.02	11.4	0.18
Zinc	520	0.0442	22.984	0.07	0.04	0.0028	170	21	340	79	0.0392	11.92856	1	0.55	63.4824727	224	0.28	10.5	**6.05**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PG 32. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0143	0.00858	0.0073	0.201	0.0014673	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	80	0.0143	1.144	0.0018	0.201	0.0003618	8	61	2	39	0.1377	0.779382	1	2.2	0.874429	9.63	0.09	1.91	0.46
Barium	663	0.0143	9.4809	0.054	0.201	0.010854	250	61	38.5	39	0.1377	23.0668155	1	2.2	14.79934977	51	0.29	5.1	**2.90**
Beryllium	2.68	0.0143	0.038324	0.00005	0.201	0.00001005	4.8	61	0.85	39	0.1377	0.44883315	1	2.2	0.221439636	6.2	0.04	0.62	0.36
Cadmium	9.6	0.0143	0.13728	0.0024	0.201	0.0004824	12.9	61	2.3	39	0.1377	1.2070782	1	2.2	0.611291182	2.3	0.27	0.23	**2.66**
Cobalt	139	0.0143	1.9877	0.00025	0.201	0.00005025	11.3	61	2.3	39	0.1377	1.072683	1	2.2	1.391106023	20	0.07	5	0.28
Copper	20	0.0143	0.286	0.04	0.201	0.00804	36	61	20	39	0.1377	4.097952	1	2.2	1.99636	35.4	0.06	24.3	0.08
Manganese	63300	0.0143	905.19	1.07	0.201	0.21507	38800	61	4120	39	0.1377	3480.33996	1	2.2	1993.520468	268	**7.44**	83	**24.02**
Nickel	460	0.0143	6.578	0.02	0.201	0.00402	140	61	19	39	0.1377	12.779937	1	2.2	8.800889545	42.1	0.21	23.1	0.38
Selenium	1.4	0.0143	0.02002	0.0046	0.201	0.0009246	0.5	61	0.4	39	0.1377	0.0634797	1	2.2	0.038374682	0.25	0.15	0.025	**1.53**
Silver	0.09	0.0143	0.001287	0.01	0.201	0.00201	0.5	61	0.25	39	0.1377	0.05542425	1	2.2	0.026691477	2.7	0.01	0.27	0.10
Uranium	47	0.0143	0.6721	0.1	0.201	0.0201	108.66	61	30.8	39	0.1377	10.7809307	1	2.2	5.21505942	5	**1.04**	0.5	**10.43**
Vanadium	25.9	0.0143	0.37037	0.0049	0.201	0.0009849	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	520	0.0143	7.436	0.07	0.201	0.01407	340	61	170	39	0.1377	37.68849	1	2.2	20.51752727	225	0.09	22.5	0.91

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 34. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00184	0.001104	0.0073	0.057	0.0004161	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	80	0.00184	0.1472	0.0018	0.057	0.0001026	8	100	0.18216	1.45728	1	0.541	2.965956747	9.63	0.31	1.91	**1.55**
Barium	663	0.00184	1.21992	0.054	0.057	0.003078	250	100	0.18216	45.54	1	0.541	86.43807394	51	**1.69**	5.1	**16.95**
Beryllium	2.68	0.00184	0.0049312	0.00005	0.057	0.00000285	4.8	100	0.18216	0.874368	1	0.541	1.625327264	6.2	0.26	0.62	**2.62**
Cadmium	9.6	0.00184	0.017664	0.0024	0.057	0.0001368	12.9	100	0.18216	2.349864	1	0.541	4.376459889	2.3	**1.90**	0.23	**19.03**
Cobalt	139	0.00184	0.25576	0.00025	0.057	0.00001425	11.3	100	0.18216	2.058408	1	0.541	4.277601201	20	0.21	5	0.86
Copper	20	0.00184	0.0368	0.04	0.057	0.00228	36	100	0.18216	6.55776	1	0.541	12.19378928	35.4	0.34	24.3	0.50
Manganese	63300	0.00184	116.472	1.07	0.057	0.06099	38800	100	0.18216	7067.808	1	0.541	13279.74305	268	**49.55**	83	**160.00**
Nickel	460	0.00184	0.8464	0.02	0.057	0.00114	140	100	0.18216	25.5024	1	0.541	48.70598891	42.1	**1.16**	23.1	**2.11**
Selenium	1.4	0.00184	0.002576	0.0046	0.057	0.0002622	0.5	100	0.18216	0.09108	1	0.541	0.173601109	0.25	0.69	0.025	**6.94**
Silver	0.09	0.00184	0.0001656	0.01	0.057	0.00057	0.5	100	0.18216	0.09108	1	0.541	0.169714603	2.7	0.06	0.27	0.63
Uranium	47	0.00184	0.08648	0.1	0.057	0.0057	108.657194	100	0.18216	19.792994	1	0.541	36.75632987	5	**7.35**	0.5	**73.51**
Vanadium	25.9	0.00184	0.047656	0.0049	0.057	0.0002793	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	520	0.00184	0.9568	0.07	0.057	0.00399	340	100	0.18216	61.9344	1	0.541	116.2572828	225	0.52	22.5	**5.17**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 31. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	1.8	0.000687	0.0012366	0.004	0.0665	0.000266	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	82.1	0.000687	0.0564027	0.00036	0.0665	0.00002394	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	112	0.000687	0.076944	0.0781	0.0665	0.00519365	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	0.95	0.000687	0.00065265	0.000085	0.0665	5.6525E-06	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	0.75	0.000687	0.00051525	0.00037	0.0665	0.000024605	73	0.02701	100	0.408313	0.01102853	1	0.5	0.023136778	2.3	0.010	0.23	0.101
Cobalt	23.1	0.000687	0.0158697	0.0018	0.0665	0.0001197	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	57.5	0.000687	0.0395025	0.0084	0.0665	0.0005586	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	3090	0.000687	2.12283	0.369	0.0665	0.0245385	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	37.1	0.000687	0.0254877	0.0035	0.0665	0.00023275	61	0.2135	100	0.408313	0.08717483	1	0.5	0.225790551	42.1	0.005	23.1	0.010
Selenium	0.65	0.000687	0.00044655	0.000065	0.0665	4.3225E-06	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.31	0.000687	0.00021297	0.0009	0.0665	0.00005985	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	406	0.000687	0.278922	0.255	0.0665	0.0169575	50	12.75	100	0.408313	5.20599075	1	0.5	11.0037405	5	**2.201**	0.5	**22.007**
Vanadium	32.8	0.000687	0.0225336	0.00025	0.0665	0.000016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	142	0.000687	0.097554	0.0087	0.0665	0.00057855	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 18. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	1.8	0.000576	0.0010368	0.004	0.097	0.000388	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	82.1	0.000576	0.0472896	0.00036	0.097	0.00003492	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	112	0.000576	0.064512	0.0781	0.097	0.0075757	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	0.95	0.000576	0.0005472	0.000085	0.097	0.000008245	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	0.75	0.000576	0.000432	0.00037	0.097	0.00003589	73	0.02701	100	0.342424	0.00924887	1	2.09	0.004649169	3.4	0.0014	0.85	0.005
Cobalt	23.1	0.000576	0.0133056	0.0018	0.097	0.0001746	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	57.5	0.000576	0.03312	0.0084	0.097	0.0008148	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	3090	0.000576	1.77984	0.369	0.097	0.035793	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	37.1	0.000576	0.0213696	0.0035	0.097	0.0003395	61	0.2135	100	0.342424	0.07310752	1	2.09	0.045366806	79	0.0006	57.2	0.001
Selenium	0.65	0.000576	0.0003744	0.000065	0.097	0.000006305	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.31	0.000576	0.00017856	0.0009	0.097	0.0000873	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	406	0.000576	0.233856	0.255	0.097	0.024735	50	12.75	100	0.342424	4.365906	1	2.09	2.21267799	1,600	0.0014	160	0.014
Vanadium	32.8	0.000576	0.0188928	0.00025	0.097	0.00002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	142	0.000576	0.081792	0.0087	0.097	0.0008439	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 18 . Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Aluminum	20100	0.000895	17.9895	0.451	0.14	0.06314	ND	N/A	100	0.532105	N/A	1	3.63	N/A	68.7	N/A	49.8	N/A
Arsenic	82.1	0.000895	0.0734795	0.00036	0.14	0.0000504	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	112	0.000895	0.10024	0.0781	0.14	0.010934	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	0.95	0.000895	0.00085025	0.000085	0.14	0.0000119	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	0.75	0.000895	0.00067125	0.00037	0.14	0.0000518	73	0.02701	100	0.532105	0.014372156	1	3.63	0.00415846	3.4	0.001	0.85	0.0049
Cobalt	23.1	0.000895	0.0206745	0.0018	0.14	0.000252	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	57.5	0.000895	0.0514625	0.0084	0.14	0.001176	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	3090	0.000895	2.76555	0.369	0.14	0.05166	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	37.1	0.000895	0.0332045	0.0035	0.14	0.00049	61	0.2135	100	0.532105	0.113604418	1	3.63	0.04057821	79	0.001	57.2	0.001
Selenium	0.65	0.000895	0.00058175	0.000065	0.14	0.0000091	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.31	0.000895	0.00027745	0.0009	0.14	0.000126	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	406	0.000895	0.36337	0.255	0.14	0.0357	50	12.75	100	0.532105	6.78433875	1	3.63	1.97890048	1,600	0.001	160	0.012
Vanadium	32.8	0.000895	0.029356	0.00025	0.14	0.000035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	142	0.000895	0.12709	0.0087	0.14	0.001218	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 29. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.65	0.000687	0.00044655	0.0025	0.0665	0.00016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	26.5	0.000687	0.0182055	0.0175	0.0665	0.00116375	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	689	0.000687	0.473343	0.0121	0.0665	0.00080465	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	29.8	0.000687	0.0204726	0.06	0.0665	0.00399	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	11.2	0.000687	0.0076944	0.07	0.0665	0.004655	73	5.11	100	0.408313	2.08647943	1	0.5	4.19765766	2.3	**1.825**	0.23	**18.251**
Cobalt	166	0.000687	0.114042	1.33	0.0665	0.088445	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	751	0.000687	0.515937	0.384	0.0665	0.025536	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	4330	0.000687	2.97471	142	0.0665	9.443	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	757	0.000687	0.520059	2.76	0.0665	0.18354	61	168.36	100	0.408313	68.7435767	1	0.5	138.8943514	42.1	**3.299**	23.1	**6.013**
Selenium	0.5	0.000687	0.0003435	0.0717	0.0665	0.00476805	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.26	0.000687	0.00017862	0.005	0.0665	0.0003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	5780	0.000687	3.97086	30	0.0665	1.995	50	1500	100	0.408313	612.4695	1	0.5	1236.87072	5	**247.374**	0.5	**2473.741**
Vanadium	16.3	0.000687	0.0111981	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	995	0.000687	0.683565	6	0.0665	0.399	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 16. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.65	0.000576	0.0003744	0.0025	0.097	0.0002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	26.5	0.000576	0.015264	0.0175	0.097	0.0016975	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	689	0.000576	0.396864	0.0121	0.097	0.0011737	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	29.8	0.000576	0.0171648	0.06	0.097	0.00582	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	11.2	0.000576	0.0064512	0.07	0.097	0.00679	73	5.11	100	0.342424	1.74978664	1	2.09	0.84355399	3.4	0.2481	0.85	0.992
Cobalt	166	0.000576	0.095616	1.33	0.097	0.12901	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	751	0.000576	0.432576	0.384	0.097	0.037248	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	4330	0.000576	2.49408	142	0.097	13.774	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	757	0.000576	0.436032	2.76	0.097	0.26772	61	168.36	100	0.342424	57.6505046	1	2.09	27.92069696	79	0.3534	57.2	0.488
Selenium	0.5	0.000576	0.000288	0.0717	0.097	0.0069549	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.26	0.000576	0.00014976	0.005	0.097	0.000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	5780	0.000576	3.32928	30	0.097	2.91	50	1500	100	0.342424	513.636	1	2.09	248.7441531	1,600	0.1555	160	**1.555**
Vanadium	16.3	0.000576	0.0093888	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	995	0.000576	0.57312	6	0.097	0.582	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
BAF:	Bioaccumulation factor
ND:	Not defined; database insufficient to derive values
N/A:	Value could not be calculated with the information available

TABLE PR 16. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.65	0.000895	0.00058175	0.0025	0.14	0.00035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	26.5	0.000895	0.0237175	0.0175	0.14	0.00245	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	689	0.000895	0.616655	0.0121	0.14	0.001694	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	29.8	0.000895	0.026671	0.06	0.14	0.0084	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	11.2	0.000895	0.010024	0.07	0.14	0.0098	73	5.11	100	0.532105	2.71905655	1	3.63	0.75451255	3.4	0.222	0.85	0.888
Cobalt	166	0.000895	0.14857	1.33	0.14	0.1862	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	751	0.000895	0.672145	0.384	0.14	0.05376	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	4330	0.000895	3.87535	142	0.14	19.88	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	757	0.000895	0.677515	2.76	0.14	0.3864	61	168.36	100	0.532105	89.5851978	1	3.63	24.9722074	79	0.316	57.2	0.437
Selenium	0.5	0.000895	0.0004475	0.0717	0.14	0.010038	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.26	0.000895	0.0002327	0.005	0.14	0.0007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	5780	0.000895	5.1731	30	0.14	4.2	50	1500	100	0.532105	798.1575	1	3.63	222.46022	1,600	0.139	160	**1.390**
Vanadium	16.3	0.000895	0.0145885	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	995	0.000895	0.890525	6	0.14	0.84	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 27. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.75	0.000687	0.00051525	0.002	0.0665	0.000133	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	54.7	0.000687	0.0375789	0.0163	0.0665	0.00108395	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	516	0.000687	0.354492	0.0482	0.0665	0.0032053	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	7	0.000687	0.004809	0.05	0.0665	0.003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	0.155	0.000687	0.000106485	0.07	0.0665	0.004655	73	5.11	100	0.408313	2.08647943	1	0.5	4.18248183	2.3	**1.818**	0.23	**18.185**
Cobalt	62.1	0.000687	0.0426627	1.1	0.0665	0.07315	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	102	0.000687	0.070074	0.286	0.0665	0.019019	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	1350	0.000687	0.92745	120	0.0665	7.98	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	87.6	0.000687	0.0601812	2.43	0.0665	0.161595	61	148.23	100	0.408313	60.524236	1	0.5	121.4920244	42.1	**2.886**	23.1	**5.259**
Selenium	0.6	0.000687	0.0004122	0.0653	0.0665	0.00434245	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.3	0.000687	0.0002061	0.06	0.0665	0.00399	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	917	0.000687	0.629979	24	0.0665	1.596	50	1200	100	0.408313	489.9756	1	0.5	984.403158	5	**196.881**	0.5	**1968.806**
Vanadium	41.2	0.000687	0.0283044	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	315	0.000687	0.216405	5.48	0.0665	0.36442	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 14. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.000576	0.000432	0.002	0.097	0.000194	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	54.7	0.000576	0.0315072	0.0163	0.097	0.0015811	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	516	0.000576	0.297216	0.0482	0.097	0.0046754	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	7	0.000576	0.004032	0.05	0.097	0.00485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	0.155	0.000576	0.00008928	0.07	0.097	0.00679	73	5.11	100	0.342424	1.74978664	1	2.09	0.84051001	3.4	0.2472	0.85	0.989
Cobalt	62.1	0.000576	0.0357696	1.1	0.097	0.1067	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	102	0.000576	0.058752	0.286	0.097	0.027742	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	1350	0.000576	0.7776	120	0.097	11.64	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	87.6	0.000576	0.0504576	2.43	0.097	0.23571	61	148.23	100	0.342424	50.7575095	1	2.09	24.42281202	79	0.3091	57.2	0.427
Selenium	0.6	0.000576	0.0003456	0.0653	0.097	0.0063341	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.3	0.000576	0.0001728	0.06	0.097	0.00582	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	917	0.000576	0.528192	24	0.097	2.328	50	1200	100	0.342424	410.9088	1	2.09	197.9736804	1,600	0.1237	160	**1.237**
Vanadium	41.2	0.000576	0.0237312	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	315	0.000576	0.18144	5.48	0.097	0.53156	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 14. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.75	0.000895	0.00067125	0.002	0.14	0.00028	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	54.7	0.000895	0.0489565	0.0163	0.14	0.002282	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	516	0.000895	0.46182	0.0482	0.14	0.006748	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	7	0.000895	0.006265	0.05	0.14	0.007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	0.155	0.000895	0.000138725	0.07	0.14	0.0098	73	5.11	100	0.532105	2.71905655	1	3.63	0.75178933	3.4	0.221	0.85	0.884
Cobalt	62.1	0.000895	0.0555795	1.1	0.14	0.154	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	102	0.000895	0.09129	0.286	0.14	0.04004	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	1350	0.000895	1.20825	120	0.14	16.8	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	87.6	0.000895	0.078402	2.43	0.14	0.3402	61	148.23	100	0.532105	78.87392415	1	3.63	21.8436711	79	0.277	57.2	0.382
Selenium	0.6	0.000895	0.000537	0.0653	0.14	0.009142	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.3	0.000895	0.0002685	0.06	0.14	0.0084	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	917	0.000895	0.820715	24	0.14	3.36	50	1200	100	0.532105	638.526	1	3.63	177.054191	1,600	0.111	160	**1.107**
Vanadium	41.2	0.000895	0.036874	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	315	0.000895	0.281925	5.48	0.14	0.7672	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 28. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.6	0.000687	0.0004122	0.0025	0.0665	0.00016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	25.4	0.000687	0.0174498	0.001	0.0665	0.0000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	131	0.000687	0.089997	0.008	0.0665	0.000532	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	3.6	0.000687	0.0024732	0.014	0.0665	0.000931	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	0.115	0.000687	0.000079005	0.0002	0.0665	0.0000133	73	0.0146	100	0.408313	0.00596137	1	0.5	0.01210735	2.3	0.005	0.23	0.053
Cobalt	23.1	0.000687	0.0158697	0.0025	0.0665	0.00016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	26.7	0.000687	0.0183429	0.0231	0.0665	0.00153615	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	1820	0.000687	1.25034	0.88	0.0665	0.05852	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	38.6	0.000687	0.0265182	0.66	0.0665	0.04389	61	40.26	100	0.408313	16.4386814	1	0.5	33.01817916	42.1	0.784	23.1	**1.429**
Selenium	0.47	0.000687	0.00032289	0.003	0.0665	0.0001995	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.235	0.000687	0.000161445	0.01	0.0665	0.000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	772	0.000687	0.530364	3.3	0.0665	0.21945	50	165	100	0.408313	67.371645	1	0.5	136.242918	5	**27.249**	0.5	**272.486**
Vanadium	46.1	0.000687	0.0316707	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	79.8	0.000687	0.0548226	0.06	0.0665	0.00399	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 15. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000576	0.0003456	0.0025	0.097	0.0002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	25.4	0.000576	0.0146304	0.001	0.097	0.000097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	131	0.000576	0.075456	0.008	0.097	0.000776	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	3.6	0.000576	0.0020736	0.014	0.097	0.001358	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	0.115	0.000576	0.00006624	0.0002	0.097	0.0000194	73	0.0146	100	0.342424	0.00499939	1	2.09	0.002433029	3.4	0.0007	0.85	0.003
Cobalt	23.1	0.000576	0.0133056	0.0025	0.097	0.0002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	26.7	0.000576	0.0153792	0.0231	0.097	0.0022407	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	1820	0.000576	1.04832	0.88	0.097	0.08536	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	38.6	0.000576	0.0222336	0.66	0.097	0.06402	61	40.26	100	0.342424	13.7859902	1	2.09	6.637437244	79	0.0840	57.2	0.116
Selenium	0.47	0.000576	0.00027072	0.003	0.097	0.000291	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.235	0.000576	0.00013536	0.01	0.097	0.00097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	772	0.000576	0.444672	3.3	0.097	0.3201	50	165	100	0.342424	56.49996	1	2.09	27.3993933	1,600	0.0171	160	0.171
Vanadium	46.1	0.000576	0.0265536	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	79.8	0.000576	0.0459648	0.06	0.097	0.00582	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 15. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000895	0.000537	0.0025	0.14	0.00035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	25.4	0.000895	0.022733	0.001	0.14	0.00014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	131	0.000895	0.117245	0.008	0.14	0.00112	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	3.6	0.000895	0.003222	0.014	0.14	0.00196	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	0.115	0.000895	0.000102925	0.0002	0.14	0.000028	73	0.0146	100	0.532105	0.007768733	1	3.63	0.00217621	3.4	0.001	0.85	0.003
Cobalt	23.1	0.000895	0.0206745	0.0025	0.14	0.00035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	26.7	0.000895	0.0238965	0.0231	0.14	0.003234	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	1820	0.000895	1.6289	0.88	0.14	0.1232	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	38.6	0.000895	0.034547	0.66	0.14	0.0924	61	40.26	100	0.532105	21.4225473	1	3.63	5.93649981	79	0.075	57.2	0.104
Selenium	0.47	0.000895	0.00042065	0.003	0.14	0.00042	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.235	0.000895	0.000210325	0.01	0.14	0.0014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	772	0.000895	0.69094	3.3	0.14	0.462	50	165	100	0.532105	87.797325	1	3.63	24.5042052	1,600	0.015	160	0.153
Vanadium	46.1	0.000895	0.0412595	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	79.8	0.000895	0.071421	0.06	0.14	0.0084	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 36. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000687	0.0004122	0.0052	0.0665	0.0003458	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	6	0.000687	0.004122	0.0015	0.0665	0.00009975	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	71.6	0.000687	0.0491892	0.0497	0.0665	0.00330505	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	0.56	0.000687	0.00038472	0.00005	0.0665	0.000003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	1	0.000687	0.000687	0.0015	0.0665	0.00009975	73	0.1095	100	0.408313	0.04471027	1	0.5	0.090994047	2.3	0.040	0.23	0.396
Cobalt	15	0.000687	0.010305	0.00025	0.0665	0.000016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	4.1	0.000687	0.0028167	0.0247	0.0665	0.00164255	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	7480	0.000687	5.13876	0.0398	0.0665	0.0026467	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	32	0.000687	0.021984	0.0021	0.0665	0.00013965	61	0.1281	100	0.408313	0.0523049	1	0.5	0.148857091	42.1	0.004	23.1	0.006
Selenium	2	0.000687	0.001374	0.002	0.0665	0.000133	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.025	0.000687	0.000017175	0.00035	0.0665	0.000023275	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	19.7	0.000687	0.0135339	0.07	0.0665	0.004655	50	3.5	100	0.408313	1.4290955	1	0.5	2.8945688	5	0.579	0.5	**5.789**
Vanadium	9.2	0.000687	0.0063204	0.0043	0.0665	0.00028595	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	41	0.000687	0.028167	0.0603	0.0665	0.00400995	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 23. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000576	0.0003456	0.0052	0.097	0.0005044	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	6	0.000576	0.003456	0.0015	0.097	0.0001455	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	71.6	0.000576	0.0412416	0.0497	0.097	0.0048209	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	0.56	0.000576	0.00032256	0.00005	0.097	0.00000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	1	0.000576	0.000576	0.0015	0.097	0.0001455	73	0.1095	100	0.342424	0.03749543	1	2.09	0.018285611	3.4	0.0054	0.85	0.022
Cobalt	15	0.000576	0.00864	0.00025	0.097	0.00002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	4.1	0.000576	0.0023616	0.0247	0.097	0.0023959	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	7480	0.000576	4.30848	0.0398	0.097	0.0038606	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	32	0.000576	0.018432	0.0021	0.097	0.0002037	61	0.1281	100	0.342424	0.04386451	1	2.09	0.029904409	79	0.0004	57.2	0.001
Selenium	2	0.000576	0.001152	0.002	0.097	0.000194	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.025	0.000576	0.0000144	0.00035	0.097	0.00003395	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	19.7	0.000576	0.0113472	0.07	0.097	0.00679	50	3.5	100	0.342424	1.198484	1	2.09	0.582115407	1,600	0.0004	160	0.004
Vanadium	9.2	0.000576	0.0052992	0.0043	0.097	0.0004171	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	41	0.000576	0.023616	0.0603	0.097	0.0058491	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 23. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.6	0.000895	0.000537	0.0052	0.14	0.000728	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	6	0.000895	0.00537	0.0015	0.14	0.00021	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	71.6	0.000895	0.064082	0.0497	0.14	0.006958	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	0.56	0.000895	0.0005012	0.00005	0.14	0.000007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	1	0.000895	0.000895	0.0015	0.14	0.00021	73	0.1095	100	0.532105	0.058265498	1	3.63	0.01635551	3.4	0.005	0.85	0.019
Cobalt	15	0.000895	0.013425	0.00025	0.14	0.000035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	4.1	0.000895	0.0036695	0.0247	0.14	0.003458	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	7480	0.000895	6.6946	0.0398	0.14	0.005572	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	32	0.000895	0.02864	0.0021	0.14	0.000294	61	0.1281	100	0.532105	0.068162651	1	3.63	0.02674839	79	0.000	57.2	0.000
Selenium	2	0.000895	0.00179	0.002	0.14	0.00028	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.025	0.000895	0.000022375	0.00035	0.14	0.000049	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	19.7	0.000895	0.0176315	0.07	0.14	0.0098	50	3.5	100	0.532105	1.8623675	1	3.63	0.52060579	1,600	0.000	160	0.003
Vanadium	9.2	0.000895	0.008234	0.0043	0.14	0.000602	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	41	0.000895	0.036695	0.0603	0.14	0.008442	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 31. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0442	0.02652	0.0052	0.04	0.000208	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	6	0.0442	0.2652	0.0015	0.04	0.00006	1.5	21	4	79	0.0392	0.13622	1	0.55	0.72996364	22.8	0.03	5.7	0.13
Barium	71.6	0.0442	3.16472	0.0497	0.04	0.001988	147	21	463	79	0.0392	15.548288	1	0.55	34.0272655	416.5	0.08	208.3	0.16
Beryllium	0.56	0.0442	0.024752	0.00005	0.04	0.000002	0.15	21	0.5	79	0.0392	0.0167188	1	0.55	0.07540509	NS	N/A	NS	N/A
Cadmium	1	0.0442	0.0442	0.0015	0.04	0.00006	0.6	21	0.3	79	0.0392	0.0142296	1	0.55	0.10634473	3.4	0.03	0.85	0.13
Cobalt	15	0.0442	0.663	0.00025	0.04	0.00001	2.97	21	5.2	79	0.0392	0.18548264	1	0.55	1.54271389	43.9	0.04	23.1	0.07
Copper	4.1	0.0442	0.18122	0.0247	0.04	0.000988	35.6	21	32	79	0.0392	1.2840352	1	0.55	2.66589673	33.2	0.08	26.9	0.10
Manganese	7480	0.0442	330.616	0.0398	0.04	0.001592	797	21	3560	79	0.0392	116.806984	1	0.55	813.499229	9770	0.08	977	0.83
Nickel	32	0.0442	1.4144	0.0021	0.04	0.000084	5	21	9	79	0.0392	0.319872	1	0.55	3.15337455	79	0.04	57.2	0.06
Selenium	2	0.0442	0.0884	0.002	0.04	0.00008	0.4	21	0.3	79	0.0392	0.0125832	1	0.55	0.18375127	0.8	0.23	0.4	0.46
Silver	0.025	0.0442	0.001105	0.00035	0.04	0.000014	0.43	21	0.2	79	0.0392	0.00973336	1	0.55	0.01973156	39.7	0.00	3.97	0.00
Uranium	19.7	0.0442	0.87074	0.07	0.04	0.0028	9.1	21	23.33	79	0.0392	0.797372479	1	0.55	3.03802269	1,600	0.00	160	0.02
Vanadium	9.2	0.0442	0.40664	0.0043	0.04	0.000172	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	41	0.0442	1.8122	0.0603	0.04	0.002412	186	21	45	79	0.0392	2.924712	1	0.55	8.61695273	224	0.04	10.5	0.82

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 31. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
Antimony	0.6	0.0143	0.00858	0.0052	0.201	0.0010452	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	6	0.0143	0.0858	0.0015	0.201	0.0003015	4	61	1.5	39	0.1377	0.4165425	1	2.2	0.228474545	9.63	0.02	1.91	0.12
Barium	71.6	0.0143	1.02388	0.0497	0.201	0.0099897	463	61	147	39	0.1377	46.784952	1	2.2	21.73582805	51	0.43	5.1	**4.26**
Beryllium	0.56	0.0143	0.008008	0.00005	0.201	0.00001005	0.5	61	0.15	39	0.1377	0.05005395	1	2.2	0.026396364	6.2	0.00	0.62	0.04
Cadmium	1	0.0143	0.0143	0.0015	0.201	0.0003015	0.3	61	0.6	39	0.1377	0.0574209	1	2.2	0.032737455	2.3	0.01	0.23	0.14
Cobalt	15	0.0143	0.2145	0.00025	0.201	0.00005025	5.2	61	2.97	39	0.1377	0.59628231	1	2.2	0.368560255	20	0.02	5	0.07
Copper	4.1	0.0143	0.05863	0.0247	0.201	0.0049647	32	61	35.6	39	0.1377	4.5997308	1	2.2	2.119693409	35.4	0.06	24.3	0.09
Manganese	7480	0.0143	106.964	0.0398	0.201	0.0079998	3560	61	797	39	0.1377	341.830611	1	2.2	204.0011867	268	0.76	83	**2.46**
Nickel	32	0.0143	0.4576	0.0021	0.201	0.0004221	9	61	5	39	0.1377	1.024488	1	2.2	0.673868227	42.1	0.02	23.1	0.03
Selenium	2	0.0143	0.0286	0.002	0.201	0.000402	0.3	61	0.4	39	0.1377	0.0466803	1	2.2	0.034401045	0.25	0.14	0.025	**1.38**
Silver	0.025	0.0143	0.0003575	0.00035	0.201	0.00007035	0.2	61	0.43	39	0.1377	0.03989169	1	2.2	0.018327064	2.7	0.01	0.27	0.07
Uranium	19.7	0.0143	0.28171	0.07	0.201	0.01407	23.3292844	61	9.1	39	0.1377	2.4482872	1	2.2	1.247303274	5	0.25	0.5	**2.49**
Vanadium	9.2	0.0143	0.13156	0.0043	0.201	0.0008643	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	41	0.0143	0.5863	0.0603	0.201	0.0121203	45	61	186	39	0.1377	13.768623	1	2.2	6.530474227	225	0.03	22.5	0.29

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 33. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00184	0.001104	0.0052	0.057	0.0002964	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	6	0.00184	0.01104	0.0015	0.057	0.0000855	4	100	0.18216	0.72864	1	0.541	1.367403882	9.63	0.14	1.91	0.72
Barium	71.6	0.00184	0.131744	0.0497	0.057	0.0028329	463	100	0.18216	84.34008	1	0.541	156.1453917	51	**3.06**	5.1	**30.62**
Beryllium	0.56	0.00184	0.0010304	0.00005	0.057	0.00000285	0.5	100	0.18216	0.09108	1	0.541	0.170264787	6.2	0.03	0.62	0.27
Cadmium	1	0.00184	0.00184	0.0015	0.057	0.0000855	0.3	100	0.18216	0.054648	1	0.541	0.104572089	2.3	0.05	0.23	0.45
Cobalt	15	0.00184	0.0276	0.00025	0.057	0.00001425	5.2	100	0.18216	0.947232	1	0.541	1.801933919	20	0.09	5	0.36
Copper	4.1	0.00184	0.007544	0.0247	0.057	0.0014079	32	100	0.18216	5.82912	1	0.541	10.79126044	35.4	0.30	24.3	0.44
Manganese	7480	0.00184	13.7632	0.0398	0.057	0.0022686	3560	100	0.18216	648.4896	1	0.541	1224.131365	268	**4.57**	83	**14.75**
Nickel	32	0.00184	0.05888	0.0021	0.057	0.0001197	9	100	0.18216	1.63944	1	0.541	3.139444917	42.1	0.07	23.1	0.14
Selenium	2	0.00184	0.00368	0.002	0.057	0.000114	0.3	100	0.18216	0.054648	1	0.541	0.108025878	0.25	0.43	0.025	**4.32**
Silver	0.025	0.00184	0.000046	0.00035	0.057	0.00001995	0.2	100	0.18216	0.036432	1	0.541	0.067463863	2.7	0.02	0.27	0.25
Uranium	19.7	0.00184	0.036248	0.07	0.057	0.00399	23.3292844	100	0.18216	4.2496624	1	0.541	7.929575686	5	**1.59**	0.5	**15.86**
Vanadium	9.2	0.00184	0.016928	0.0043	0.057	0.0002451	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	41	0.00184	0.07544	0.0603	0.057	0.0034371	45	100	0.18216	8.1972	1	0.541	15.29773956	225	0.07	22.5	0.68

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 34. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Eastern Drainage, Instream Sediment
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000687	0.00044655	0.0048	0.0665	0.0003192	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	17.8	0.000687	0.0122286	0.0093	0.0665	0.00061845	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	135	0.000687	0.092745	0.105	0.0665	0.0069825	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	1.3	0.000687	0.0008931	0.00005	0.0665	0.000003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	0.7	0.000687	0.0004809	0.0044	0.0665	0.0002926	73	0.3212	100	0.408313	0.13115014	1	0.5	0.263847271	2.3	0.115	0.23	**1.147**
Cobalt	23.3	0.000687	0.0160071	0.0024	0.0665	0.0001596	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	29.9	0.000687	0.0205413	0.051	0.0665	0.0033915	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	2240	0.000687	1.53888	15.9	0.0665	1.05735	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	34.9	0.000687	0.0239763	0.32	0.0665	0.02128	61	19.52	100	0.408313	7.97026976	1	0.5	16.03105212	42.1	0.381	23.1	0.694
Selenium	0.5	0.000687	0.0003435	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.66	0.000687	0.00045342	0.01	0.0665	0.000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	78.5	0.000687	0.0539295	0.13	0.0665	0.008645	50	6.5	100	0.408313	2.6540345	1	0.5	5.433218	5	**1.087**	0.5	**10.866**
Vanadium	35.5	0.000687	0.0243885	0.0082	0.0665	0.0005453	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	97.7	0.000687	0.0671199	0.38	0.0665	0.02527	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 21. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.65	0.000576	0.0003744	0.0048	0.097	0.0004656	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	17.8	0.000576	0.0102528	0.0093	0.097	0.0009021	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	135	0.000576	0.07776	0.105	0.097	0.010185	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	1.3	0.000576	0.0007488	0.00005	0.097	0.00000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	0.7	0.000576	0.0004032	0.0044	0.097	0.0004268	73	0.3212	100	0.342424	0.10998659	1	2.09	0.053022291	3.4	0.0156	0.85	0.062
Cobalt	23.3	0.000576	0.0134208	0.0024	0.097	0.0002328	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	29.9	0.000576	0.0172224	0.051	0.097	0.004947	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	2240	0.000576	1.29024	15.9	0.097	1.5423	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	34.9	0.000576	0.0201024	0.32	0.097	0.03104	61	19.52	100	0.342424	6.68411648	1	2.09	3.222611904	79	0.0408	57.2	0.056
Selenium	0.5	0.000576	0.000288	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.66	0.000576	0.00038016	0.01	0.097	0.00097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	78.5	0.000576	0.045216	0.13	0.097	0.01261	50	6.5	100	0.342424	2.225756	1	2.09	1.092622967	1,600	0.0007	160	0.007
Vanadium	35.5	0.000576	0.020448	0.0082	0.097	0.0007954	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	97.7	0.000576	0.0562752	0.38	0.097	0.03686	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 21. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000895	0.00058175	0.0048	0.14	0.000672	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	17.8	0.000895	0.015931	0.0093	0.14	0.001302	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	135	0.000895	0.120825	0.105	0.14	0.0147	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	1.3	0.000895	0.0011635	0.00005	0.14	0.000007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	0.7	0.000895	0.0006265	0.0044	0.14	0.000616	73	0.3212	100	0.532105	0.170912126	1	3.63	0.04742552	3.4	0.014	0.85	0.056
Cobalt	23.3	0.000895	0.0208535	0.0024	0.14	0.000336	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	29.9	0.000895	0.0267605	0.051	0.14	0.00714	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	2240	0.000895	2.0048	15.9	0.14	2.226	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	34.9	0.000895	0.0312355	0.32	0.14	0.0448	61	19.52	100	0.532105	10.3866896	1	3.63	2.88229342	79	0.036	57.2	0.050
Selenium	0.5	0.000895	0.0004475	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.66	0.000895	0.0005907	0.01	0.14	0.0014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	78.5	0.000895	0.0702575	0.13	0.14	0.0182	50	6.5	100	0.532105	3.4586825	1	3.63	0.97717355	1,600	0.001	160	0.006
Vanadium	35.5	0.000895	0.0317725	0.0082	0.14	0.001148	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	97.7	0.000895	0.0874415	0.38	0.14	0.0532	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 29. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0442	0.02873	0.0048	0.04	0.000192	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	17.8	0.0442	0.78676	0.0093	0.04	0.000372	4.7	21	3	79	0.0392	0.1315944	1	0.55	1.67041164	22.8	0.07	5.7	0.29
Barium	135	0.0442	5.967	0.105	0.04	0.0042	43	21	75	79	0.0392	2.676576	1	0.55	15.7232291	416.5	0.04	208.3	0.08
Beryllium	1.3	0.0442	0.05746	0.00005	0.04	0.000002	0.52	21	3	79	0.0392	0.09718464	1	0.55	0.28117571	NS	N/A	NS	N/A
Cadmium	0.7	0.0442	0.03094	0.0044	0.04	0.000176	8.5	21	3.8	79	0.0392	0.1876504	1	0.55	0.39775709	3.4	0.12	0.85	0.47
Cobalt	23.3	0.0442	1.02986	0.0024	0.04	0.000096	9.69	21	10.3	79	0.0392	0.39873848	1	0.55	2.59762633	43.9	0.06	23.1	0.11
Copper	29.9	0.0442	1.32158	0.051	0.04	0.00204	15.5	21	30	79	0.0392	1.056636	1	0.55	4.32773818	33.2	0.13	26.9	0.16
Manganese	2240	0.0442	99.008	15.9	0.04	0.636	1640	21	8820	79	0.0392	286.63824	1	0.55	702.331345	9770	0.07	977	0.72
Nickel	34.9	0.0442	1.54258	0.32	0.04	0.0128	18	21	66	79	0.0392	2.192064	1	0.55	6.81353455	79	0.09	57.2	0.12
Selenium	0.5	0.0442	0.0221	0.0005	0.04	0.00002	7.8	21	0.3	79	0.0392	0.0735	1	0.55	0.17385455	0.8	0.22	0.4	0.43
Silver	0.66	0.0442	0.029172	0.01	0.04	0.0004	0.78	21	0.1	79	0.0392	0.00951776	1	0.55	0.07107229	39.7	0.00	3.97	0.02
Uranium	78.5	0.0442	3.4697	0.13	0.04	0.0052	20.8	21	121.030172	79	0.0392	3.919287966	1	0.55	13.4439781	1,600	0.01	160	0.08
Vanadium	35.5	0.0442	1.5691	0.0082	0.04	0.000328	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	97.7	0.0442	4.31834	0.38	0.04	0.0152	132	21	163	79	0.0392	6.134408	1	0.55	19.0326327	224	0.09	10.5	**1.81**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 29. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
Antimony	0.65	0.0143	0.009295	0.0048	0.201	0.0009648	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	17.8	0.0143	0.25454	0.0093	0.201	0.0018693	3	61	4.7	39	0.1377	0.5043951	1	2.2	0.345820182	9.63	0.04	1.91	0.18
Barium	135	0.0143	1.9305	0.105	0.201	0.021105	75	61	43	39	0.1377	8.609004	1	2.2	4.800276818	51	0.09	5.1	0.94
Beryllium	1.3	0.0143	0.01859	0.00005	0.201	0.00001005	3	61	0.52	39	0.1377	0.27991656	1	2.2	0.135689368	6.2	0.02	0.62	0.22
Cadmium	0.7	0.0143	0.01001	0.0044	0.201	0.0008844	3.8	61	8.5	39	0.1377	0.7756641	1	2.2	0.357526591	2.3	0.16	0.23	**1.55**
Cobalt	23.3	0.0143	0.33319	0.0024	0.201	0.0004824	10.3	61	9.69	39	0.1377	1.38555117	1	2.2	0.781465259	20	0.04	5	0.16
Copper	29.9	0.0143	0.42757	0.051	0.201	0.010251	30	61	15.5	39	0.1377	3.3523065	1	2.2	1.722785227	35.4	0.05	24.3	0.07
Manganese	2240	0.0143	32.032	15.9	0.201	3.1959	8820	61	1640	39	0.1377	828.92646	1	2.2	392.7974364	268	**1.47**	83	**4.73**
Nickel	34.9	0.0143	0.49907	0.32	0.201	0.06432	66	61	18	39	0.1377	6.510456	1	2.2	3.215384545	42.1	0.08	23.1	0.14
Selenium	0.5	0.0143	0.00715	0.0005	0.201	0.0001005	0.3	61	7.8	39	0.1377	0.4440825	1	2.2	0.205151364	0.25	0.82	0.025	**8.21**
Silver	0.66	0.0143	0.009438	0.01	0.201	0.00201	0.1	61	0.78	39	0.1377	0.05028804	1	2.2	0.028061836	2.7	0.01	0.27	0.10
Uranium	78.5	0.0143	1.12255	0.13	0.201	0.02613	121.030172	61	20.8	39	0.1377	11.2831938	1	2.2	5.650851708	5	**1.13**	0.5	**11.30**
Vanadium	35.5	0.0143	0.50765	0.0082	0.201	0.0016482	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	97.7	0.0143	1.39711	0.38	0.201	0.07638	163	61	132	39	0.1377	20.780307	1	2.2	10.11536227	225	0.04	22.5	0.45

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 31. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00184	0.001196	0.0048	0.057	0.0002736	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	17.8	0.00184	0.032752	0.0093	0.057	0.0005301	3	100	0.18216	0.54648	1	0.541	1.071648983	9.63	0.11	1.91	0.56
Barium	135	0.00184	0.2484	0.105	0.057	0.005985	75	100	0.18216	13.662	1	0.541	25.72344732	51	0.50	5.1	**5.04**
Beryllium	1.3	0.00184	0.002392	0.00005	0.057	0.00000285	3	100	0.18216	0.54648	1	0.541	1.0145561	6.2	0.16	0.62	**1.64**
Cadmium	0.7	0.00184	0.001288	0.0044	0.057	0.0002508	3.8	100	0.18216	0.692208	1	0.541	1.28234159	2.3	0.56	0.23	**5.58**
Cobalt	23.3	0.00184	0.042872	0.0024	0.057	0.0001368	10.3	100	0.18216	1.876248	1	0.541	3.547609612	20	0.18	5	0.71
Copper	29.9	0.00184	0.055016	0.051	0.057	0.002907	30	100	0.18216	5.4648	1	0.541	10.20836044	35.4	0.29	24.3	0.42
Manganese	2240	0.00184	4.1216	15.9	0.057	0.9063	8820	100	0.18216	1606.6512	1	0.541	2979.074122	268	**11.12**	83	**35.89**
Nickel	34.9	0.00184	0.064216	0.32	0.057	0.01824	66	100	0.18216	12.02256	1	0.541	22.37526063	42.1	0.53	23.1	0.97
Selenium	0.5	0.00184	0.00092	0.0005	0.057	0.0000285	0.3	100	0.18216	0.054648	1	0.541	0.102766174	0.25	0.41	0.025	**4.11**
Silver	0.66	0.00184	0.0012144	0.01	0.057	0.00057	0.1	100	0.18216	0.018216	1	0.541	0.036969316	2.7	0.01	0.27	0.14
Uranium	78.5	0.00184	0.14444	0.13	0.057	0.00741	121.030172	100	0.18216	22.046856	1	0.541	41.03272852	5	**8.21**	0.5	**82.07**
Vanadium	35.5	0.00184	0.06532	0.0082	0.057	0.0004674	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	97.7	0.00184	0.179768	0.38	0.057	0.02166	163	100	0.18216	29.69208	1	0.541	55.25602218	225	0.25	22.5	**2.46**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 32. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000687			0.0665				100	0.408313		1	0.5					
Antimony	0.5	0.000687	0.0003435	0.0005	0.0665	0.00003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.62	N/A	0.062	N/A
Arsenic	5.8	0.000687	0.0039846	0.003	0.0665	0.0001995	ND	N/A	100	0.408313	N/A	1	0.5	N/A	9.63	N/A	1.91	N/A
Barium	76.3	0.000687	0.0524181	0.058	0.0665	0.003857	ND	N/A	100	0.408313	N/A	1	0.5	N/A	51	N/A	5.1	N/A
Beryllium	4.1	0.000687	0.0028167	0.0043	0.0665	0.00028595	ND	N/A	100	0.408313	N/A	1	0.5	N/A	6.2	N/A	0.62	N/A
Cadmium	1	0.000687	0.000687	0.005	0.0665	0.0003325	73	0.365	100	0.408313	0.14903425	1	0.5	0.30010749	2.3	0.130	0.23	**1.305**
Cobalt	11.2	0.000687	0.0076944	0.0019	0.0665	0.00012635	ND	N/A	100	0.408313	N/A	1	0.5	N/A	20	N/A	5	N/A
Copper	20.4	0.000687	0.0140148	0.06	0.0665	0.00399	ND	N/A	100	0.408313	N/A	1	0.5	N/A	35.4	N/A	24.3	N/A
Manganese	3130	0.000687	2.15031	15.9	0.0665	1.05735	ND	N/A	100	0.408313	N/A	1	0.5	N/A	268	N/A	83	N/A
Nickel	28	0.000687	0.019236	0.4	0.0665	0.0266	61	24.4	100	0.408313	9.9628372	1	0.5	20.0173464	42.1	0.475	23.1	0.867
Selenium	4	0.000687	0.002748	0.001	0.0665	0.0000665	ND	N/A	100	0.408313	N/A	1	0.5	N/A	0.25	N/A	0.025	N/A
Silver	0.14	0.000687	0.00009618	0.005	0.0665	0.0003325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.7	N/A	0.27	N/A
Uranium	293	0.000687	0.201291	0.103	0.0665	0.0068495	50	5.15	100	0.408313	2.10281195	1	0.5	4.6219049	5	0.924	0.5	**9.244**
Vanadium	12.8	0.000687	0.0087936	0.00025	0.0665	0.000016625	ND	N/A	100	0.408313	N/A	1	0.5	N/A	2.1	N/A	0.21	N/A
Zinc	93	0.000687	0.063891	0.5	0.0665	0.03325	ND	N/A	100	0.408313	N/A	1	0.5	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 19. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000576			0.097				100	0.342424		1	2.09					
Antimony	0.5	0.000576	0.000288	0.0005	0.097	0.0000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Arsenic	5.8	0.000576	0.0033408	0.003	0.097	0.000291	ND	N/A	100	0.342424	N/A	1	2.09	N/A	22.8	N/A	5.7	N/A
Barium	76.3	0.000576	0.0439488	0.058	0.097	0.005626	ND	N/A	100	0.342424	N/A	1	2.09	N/A	416.5	N/A	208.3	N/A
Beryllium	4.1	0.000576	0.0023616	0.0043	0.097	0.0004171	ND	N/A	100	0.342424	N/A	1	2.09	N/A	NS	N/A	NS	N/A
Cadmium	1	0.000576	0.000576	0.005	0.097	0.000485	73	0.365	100	0.342424	0.12498476	1	2.09	0.060308976	3.4	0.0177	0.85	0.071
Cobalt	11.2	0.000576	0.0064512	0.0019	0.097	0.0001843	ND	N/A	100	0.342424	N/A	1	2.09	N/A	43.9	N/A	23.1	N/A
Copper	20.4	0.000576	0.0117504	0.06	0.097	0.00582	ND	N/A	100	0.342424	N/A	1	2.09	N/A	33.2	N/A	26.9	N/A
Manganese	3130	0.000576	1.80288	15.9	0.097	1.5423	ND	N/A	100	0.342424	N/A	1	2.09	N/A	9,770	N/A	977	N/A
Nickel	28	0.000576	0.016128	0.4	0.097	0.0388	61	24.4	100	0.342424	8.3551456	1	2.09	4.02395866	79	0.0509	57.2	0.070
Selenium	4	0.000576	0.002304	0.001	0.097	0.000097	ND	N/A	100	0.342424	N/A	1	2.09	N/A	0.8	N/A	0.4	N/A
Silver	0.14	0.000576	0.00008064	0.005	0.097	0.000485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	39.7	N/A	3.97	N/A
Uranium	293	0.000576	0.168768	0.103	0.097	0.009991	50	5.15	100	0.342424	1.7634836	1	2.09	0.929302679	1,600	0.0006	160	0.006
Vanadium	12.8	0.000576	0.0073728	0.00025	0.097	0.00002425	ND	N/A	100	0.342424	N/A	1	2.09	N/A	114	N/A	11.4	N/A
Zinc	93	0.000576	0.053568	0.5	0.097	0.0485	ND	N/A	100	0.342424	N/A	1	2.09	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 19. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Fish)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000895			0.14				100	0.532105		1	3.63					
Antimony	0.5	0.000895	0.0004475	0.0005	0.14	0.00007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Arsenic	5.8	0.000895	0.005191	0.003	0.14	0.00042	ND	N/A	100	0.532105	N/A	1	3.63	N/A	22.8	N/A	5.7	N/A
Barium	76.3	0.000895	0.0682885	0.058	0.14	0.00812	ND	N/A	100	0.532105	N/A	1	3.63	N/A	416.5	N/A	208.3	N/A
Beryllium	4.1	0.000895	0.0036695	0.0043	0.14	0.000602	ND	N/A	100	0.532105	N/A	1	3.63	N/A	NS	N/A	NS	N/A
Cadmium	1	0.000895	0.000895	0.005	0.14	0.0007	73	0.365	100	0.532105	0.194218325	1	3.63	0.05394306	3.4	0.016	0.85	0.063
Cobalt	11.2	0.000895	0.010024	0.0019	0.14	0.000266	ND	N/A	100	0.532105	N/A	1	3.63	N/A	43.9	N/A	23.1	N/A
Copper	20.4	0.000895	0.018258	0.06	0.14	0.0084	ND	N/A	100	0.532105	N/A	1	3.63	N/A	33.2	N/A	26.9	N/A
Manganese	3130	0.000895	2.80135	15.9	0.14	2.226	ND	N/A	100	0.532105	N/A	1	3.63	N/A	9,770	N/A	977	N/A
Nickel	28	0.000895	0.02506	0.4	0.14	0.056	61	24.4	100	0.532105	12.983362	1	3.63	3.59901433	79	0.046	57.2	0.063
Selenium	4	0.000895	0.00358	0.001	0.14	0.00014	ND	N/A	100	0.532105	N/A	1	3.63	N/A	0.8	N/A	0.4	N/A
Silver	0.14	0.000895	0.0001253	0.005	0.14	0.0007	ND	N/A	100	0.532105	N/A	1	3.63	N/A	39.7	N/A	3.97	N/A
Uranium	293	0.000895	0.262235	0.103	0.14	0.01442	50	5.15	100	0.532105	2.74034075	1	3.63	0.83112831	1,600	0.001	160	0.005
Vanadium	12.8	0.000895	0.011456	0.00025	0.14	0.000035	ND	N/A	100	0.532105	N/A	1	3.63	N/A	114	N/A	11.4	N/A
Zinc	93	0.000895	0.083235	0.5	0.14	0.07	ND	N/A	100	0.532105	N/A	1	3.63	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 27. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0442			0.04			21		79	0.0392		1	0.55					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.0442	0.0221	0.0005	0.04	0.00002	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	NS	N/A	NS	N/A
Arsenic	5.8	0.0442	0.25636	0.003	0.04	0.00012	0.25	21	5	79	0.0392	0.156898	1	0.55	0.75159636	22.8	0.03	5.7	0.13
Barium	76.3	0.0442	3.37246	0.058	0.04	0.00232	2.2	21	74	79	0.0392	2.3097424	1	0.55	10.3354953	416.5	0.02	208.3	0.05
Beryllium	4.1	0.0442	0.18122	0.0043	0.04	0.000172	0.41	21	12.7	79	0.0392	0.39666872	1	0.55	1.05101949	NS	N/A	NS	N/A
Cadmium	1	0.0442	0.0442	0.005	0.04	0.0002	2	21	1.5	79	0.0392	0.062916	1	0.55	0.19512	3.4	0.06	0.85	0.23
Cobalt	11.2	0.0442	0.49504	0.0019	0.04	0.000076	0.46	21	27.8	79	0.0392	0.86469712	1	0.55	2.47238749	43.9	0.06	23.1	0.11
Copper	20.4	0.0442	0.90168	0.06	0.04	0.0024	37.2	21	73	79	0.0392	2.5668944	1	0.55	6.31086255	33.2	0.19	26.9	0.23
Manganese	3130	0.0442	138.346	15.9	0.04	0.636	688	21	17200	79	0.0392	538.313216	1	0.55	1231.44585	9770	0.13	977	**1.26**
Nickel	28	0.0442	1.2376	0.4	0.04	0.016	5	21	71	79	0.0392	2.239888	1	0.55	6.35179636	79	0.08	57.2	0.11
Selenium	4	0.0442	0.1768	0.001	0.04	0.00004	0.6	21	0.3	79	0.0392	0.0142296	1	0.55	0.34739927	0.8	0.43	0.4	0.87
Silver	0.14	0.0442	0.006188	0.005	0.04	0.0002	0.88	21	3.6	79	0.0392	0.11872896	1	0.55	0.22748538	39.7	0.01	3.97	0.06
Uranium	293	0.0442	12.9506	0.103	0.04	0.00412	35.9	21	1177.04835	79	0.0392	36.7463621	1	0.55	90.3656038	1,600	0.06	160	0.56
Vanadium	12.8	0.0442	0.56576	0.00025	0.04	0.00001	NM	21	NM	79	0.0392	N/A	1	0.55	N/A	114	N/A	11.4	N/A
Zinc	93	0.0442	4.1106	0.5	0.04	0.02	183	21	115	79	0.0392	5.067776	1	0.55	16.72432	224	0.07	10.5	**1.59**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 27. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Dietary Items (Aquatic Invertebrates and Aquatic Vegetation, Maximum Concentrations)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0143			0.201			61		39	0.1377		1	2.2					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.0143	0.00715	0.0005	0.201	0.0001005	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	0.62	N/A	0.062	N/A
Arsenic	5.8	0.0143	0.08294	0.003	0.201	0.000603	5	61	0.25	39	0.1377	0.43341075	1	2.2	0.234978977	9.63	0.02	1.91	0.12
Barium	76.3	0.0143	1.09109	0.058	0.201	0.011658	74	61	2.2	39	0.1377	6.3339246	1	2.2	3.380305727	51	0.07	5.1	0.66
Beryllium	4.1	0.0143	0.05863	0.0043	0.201	0.0008643	12.7	61	0.41	39	0.1377	1.08878013	1	2.2	0.521942923	6.2	0.08	0.62	0.84
Cadmium	1	0.0143	0.0143	0.005	0.201	0.001005	1.5	61	2	39	0.1377	0.2334015	1	2.2	0.113048409	2.3	0.05	0.23	0.49
Cobalt	11.2	0.0143	0.16016	0.0019	0.201	0.0003819	27.8	61	0.46	39	0.1377	2.35981998	1	2.2	1.145619036	20	0.06	5	0.23
Copper	20.4	0.0143	0.29172	0.06	0.201	0.01206	73	61	37.2	39	0.1377	8.1295326	1	2.2	3.833323909	35.4	0.11	24.3	0.16
Manganese	3130	0.0143	44.759	15.9	0.201	3.1959	17200	61	688	39	0.1377	1481.69606	1	2.2	695.2958927	268	**2.59**	83	**8.38**
Nickel	28	0.0143	0.4004	0.4	0.201	0.0804	71	61	5	39	0.1377	6.232302	1	2.2	3.05141	42.1	0.07	23.1	0.13
Selenium	4	0.0143	0.0572	0.001	0.201	0.000201	0.3	61	0.6	39	0.1377	0.0574209	1	2.2	0.052191773	0.25	0.21	0.025	**2.09**
Silver	0.14	0.0143	0.002002	0.005	0.201	0.001005	3.6	61	0.88	39	0.1377	0.34964784	1	2.2	0.160297655	2.7	0.06	0.27	0.59
Uranium	293	0.0143	4.1899	0.103	0.201	0.020703	1177.04835	61	35.9	39	0.1377	100.796468	1	2.2	47.7304868	5	**9.55**	0.5	**95.46**
Vanadium	12.8	0.0143	0.18304	0.00025	0.201	0.00005025	NM	61	NM	39	0.1377	N/A	1	2.2	N/A	2.1	N/A	0.21	N/A
Zinc	93	0.0143	1.3299	0.5	0.201	0.1005	115	61	183	39	0.1377	19.487304	1	2.2	9.508047273	225	0.04	22.5	0.42

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 29. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057			100	0.18216		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.5	0.00184	0.00092	0.0005	0.057	0.0000285	NM	100	0.18216	N/A	1	0.541	N/A	0.62	N/A	0.062	N/A
Arsenic	5.8	0.00184	0.010672	0.003	0.057	0.000171	5	100	0.18216	0.9108	1	0.541	1.703591497	9.63	0.18	1.91	0.89
Barium	76.3	0.00184	0.140392	0.058	0.057	0.003306	74	100	0.18216	13.47984	1	0.541	25.18214048	51	0.49	5.1	**4.94**
Beryllium	4.1	0.00184	0.007544	0.0043	0.057	0.0002451	12.7	100	0.18216	2.313432	1	0.541	4.290612015	6.2	0.69	0.62	**6.92**
Cadmium	1	0.00184	0.00184	0.005	0.057	0.000285	1.5	100	0.18216	0.27324	1	0.541	0.508992606	2.3	0.22	0.23	**2.21**
Cobalt	11.2	0.00184	0.020608	0.0019	0.057	0.0001083	27.8	100	0.18216	5.064048	1	0.541	9.398824954	20	0.47	5	**1.88**
Copper	20.4	0.00184	0.037536	0.06	0.057	0.00342	73	100	0.18216	13.29768	1	0.541	24.65551941	35.4	0.70	24.3	**1.01**
Manganese	3130	0.00184	5.7592	15.9	0.057	0.9063	17200	100	0.18216	3133.152	1	0.541	5803.729205	268	**21.66**	83	**69.92**
Nickel	28	0.00184	0.05152	0.4	0.057	0.0228	71	100	0.18216	12.93336	1	0.541	24.04377079	42.1	0.57	23.1	**1.04**
Selenium	4	0.00184	0.00736	0.001	0.057	0.000057	0.3	100	0.18216	0.054648	1	0.541	0.114722736	0.25	0.46	0.025	**4.59**
Silver	0.14	0.00184	0.0002576	0.005	0.057	0.000285	3.6	100	0.18216	0.655776	1	0.541	1.213158226	2.7	0.45	0.27	**4.49**
Uranium	293	0.00184	0.53912	0.103	0.057	0.005871	1177.04835	100	0.18216	214.41113	1	0.541	397.3310877	5	**79.47**	0.5	**794.66**
Vanadium	12.8	0.00184	0.023552	0.00025	0.057	0.00001425	NM	100	0.18216	N/A	1	0.541	N/A	2.1	N/A	0.21	N/A
Zinc	93	0.00184	0.17112	0.5	0.057	0.0285	115	100	0.18216	20.9484	1	0.541	39.09060998	225	0.17	22.5	**1.74**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 17. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.15	0.0004	0.00046	0.0025	0.127	0.0003175	1	0.955	0.000814136	0.62	0.001	0.062	0.013
Arsenic	62.05	0.0004	0.02482	0.004829	0.127	0.000613229	1	0.955	0.026631653	9.63	0.003	1.91	0.014
Barium	116	0.0004	0.0464	0.008914	0.127	0.001132114	1	0.955	0.049771847	51	0.001	5.1	0.010
Beryllium	1.045	0.0004	0.000418	0.016586	0.127	0.002106386	1	0.955	0.002643336	6.2	0.000	0.62	0.004
Cadmium	0.14	0.0004	0.000056	0.005943	0.127	0.000754743	1	0.955	0.000848945	2.3	0.000	0.23	0.004
Cobalt	8.6	0.0004	0.00344	0.753	0.127	0.095631	1	0.955	0.103739267	20	0.005	5	0.021
Copper	75.95	0.0004	0.03038	0.742714	0.127	0.094324714	1	0.955	0.130580853	35.4	0.004	24.3	0.005
Manganese	331	0.0004	0.1324	24.21	0.127	3.07467	1	0.955	3.358188482	268	0.013	83	0.040
Nickel	24.3	0.0004	0.00972	0.777143	0.127	0.098697143	1	0.955	0.113525804	42.1	0.003	23.1	0.005
Selenium	0.55	0.0004	0.00022	0.007514	0.127	0.000954314	1	0.955	0.001229648	0.25	0.005	0.025	0.049
Silver	0.275	0.0004	0.00011	0.001	0.127	0.000127	1	0.955	0.000248168	2.7	0.000	0.27	0.001
Uranium	75.75	0.0004	0.0303	5.199	0.127	0.660273	1	0.955	0.723113089	5	0.145	0.5	**1.446**
Vanadium	58.85	0.0004	0.02354	0.0005	0.127	0.0000635	1	0.955	0.024715707	2.1	0.012	0.21	0.118
Zinc	73.3	0.0004	0.02932	0.734286	0.127	0.093254286	1	0.955	0.128350037	225	0.001	22.5	0.006

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 17. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.15	0.00276	0.003174	0.0025	0.064	0.00016	1	1.14	0.002924561	NS	N/A	NS	N/A
Arsenic	62.05	0.00276	0.171258	0.0048286	0.064	0.000309029	1	1.14	0.150497393	22.8	0.01	5.7	0.03
Barium	116	0.00276	0.32016	0.0089143	0.064	0.000570514	1	1.14	0.281342556	416.5	0.00	208.3	0.00
Beryllium	1.045	0.00276	0.0028842	0.0165857	0.064	0.001061486	1	1.14	0.003461128	NS	N/A	NS	N/A
Cadmium	0.14	0.00276	0.0003864	0.0059429	0.064	0.000380343	1	1.14	0.000672581	3.4	0.00	0.85	0.00
Cobalt	8.6	0.00276	0.023736	0.753	0.064	0.048192	1	1.14	0.063094737	43.9	0.00	23.1	0.00
Copper	75.95	0.00276	0.209622	0.7427143	0.064	0.047533714	1	1.14	0.225575188	33.2	0.01	26.9	0.01
Manganese	331	0.00276	0.91356	24.21	0.064	1.54944	1	1.14	2.160526316	9770	0.00	977	0.00
Nickel	24.3	0.00276	0.067068	0.7771429	0.064	0.049737143	1	1.14	0.102460652	79	0.00	57.2	0.00
Selenium	0.55	0.00276	0.001518	0.0075143	0.064	0.000480914	1	1.14	0.001753434	0.8	0.00	0.4	0.00
Silver	0.275	0.00276	0.000759	0.001	0.064	0.000064	1	1.14	0.00072193	39.7	0.00	3.97	0.00
Uranium	75.75	0.00276	0.20907	5.199	0.064	0.332736	1	1.14	0.475268421	1,600	0.00	160	0.00
Vanadium	58.85	0.00276	0.162426	0.0005	0.064	0.000032	1	1.14	0.142507018	114	0.00	11.4	0.01
Zinc	73.3	0.00276	0.202308	0.7342857	0.064	0.046994286	1	1.14	0.218686216	224	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 23. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.15	0.00496	0.005704	0.0025	0.0131	0.00003275	1	0.1064	0.053916823	NS	N/A	NS	N/A
Arsenic	62.05	0.00496	0.307768	0.004829	0.0131	6.32543E-05	1	0.1064	2.893150886	22.8	0.13	5.7	0.51
Barium	116	0.00496	0.57536	0.008914	0.0131	0.000116777	1	0.1064	5.408616327	416.5	0.01	208.3	0.03
Beryllium	1.045	0.00496	0.0051832	0.016586	0.0131	0.000217273	1	0.1064	0.050756324	NS	N/A	NS	N/A
Cadmium	0.14	0.00496	0.0006944	0.005943	0.0131	7.78514E-05	1	0.1064	0.007258002	3.4	0.00	0.85	0.01
Cobalt	8.6	0.00496	0.042656	0.753	0.0131	0.0098643	1	0.1064	0.493611842	43.9	0.01	23.1	0.02
Copper	75.95	0.00496	0.376712	0.742714	0.0131	0.009729557	1	0.1064	3.631969522	33.2	0.11	26.9	0.14
Manganese	331	0.00496	1.64176	24.21	0.0131	0.317151	1	0.1064	18.41081767	9770	0.00	977	0.02
Nickel	24.3	0.00496	0.120528	0.777143	0.0131	0.010180571	1	0.1064	1.228464017	79	0.02	57.2	0.02
Selenium	0.55	0.00496	0.002728	0.007514	0.0131	9.84371E-05	1	0.1064	0.026564259	0.8	0.03	0.4	0.07
Silver	0.275	0.00496	0.001364	0.001	0.0131	0.0000131	1	0.1064	0.012942669	39.7	0.00	3.97	0.00
Uranium	75.75	0.00496	0.37572	5.199	0.0131	0.0681069	1	0.1064	4.171305451	1,600	0.00	160	0.03
Vanadium	58.85	0.00496	0.291896	0.0005	0.0131	0.00000655	1	0.1064	2.743445019	114	0.02	11.4	0.24
Zinc	73.3	0.00496	0.363568	0.734286	0.0131	0.009619143	1	0.1064	3.507397959	224	0.02	10.5	0.33

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 17. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.15	0.00469	0.0053935	0.0025	0.537	0.0013425	1	6.55	0.001028397	0.62	0.00	0.062	0.02
Arsenic	62.05	0.00469	0.2910145	0.004829	0.537	0.002592943	1	6.55	0.044825564	9.63	0.00	1.91	0.02
Barium	116	0.00469	0.54404	0.008914	0.537	0.004786971	1	6.55	0.083790377	51	0.00	5.1	0.02
Beryllium	1.045	0.00469	0.00490105	0.016586	0.537	0.008906529	1	6.55	0.002108027	6.2	0.00	0.62	0.00
Cadmium	0.14	0.00469	0.0006566	0.005943	0.537	0.003191314	1	6.55	0.000587468	2.3	0.00	0.23	0.00
Cobalt	8.6	0.00469	0.040334	0.753	0.537	0.404361	1	6.55	0.067892366	20	0.00	5	0.01
Copper	75.95	0.00469	0.3562055	0.742714	0.537	0.398837571	1	6.55	0.115273751	35.4	0.00	24.3	0.00
Manganese	331	0.00469	1.55239	24.21	0.537	13.00077	1	6.55	2.221856489	268	0.01	83	0.03
Nickel	24.3	0.00469	0.113967	0.777143	0.537	0.417325714	1	6.55	0.081113391	42.1	0.00	23.1	0.00
Selenium	0.55	0.00469	0.0025795	0.007514	0.537	0.004035171	1	6.55	0.001009874	0.25	0.00	0.025	0.04
Silver	0.275	0.00469	0.00128975	0.001	0.537	0.000537	1	6.55	0.000278893	2.7	0.00	0.27	0.00
Uranium	75.75	0.00469	0.3552675	5.199	0.537	2.791863	1	6.55	0.480477939	5	0.10	0.5	0.96
Vanadium	58.85	0.00469	0.2760065	0.0005	0.537	0.0002685	1	6.55	0.042179389	2.1	0.02	0.21	0.20
Zinc	73.3	0.00469	0.343777	0.734286	0.537	0.394311429	1	6.55	0.112685256	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 20. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.0004	0.00022	0.00025	0.127	0.00003175	1	0.955	0.000263613	0.62	0.000	0.062	0.004
Arsenic	9.85	0.0004	0.00394	0.002742	0.127	0.000348218	1	0.955	0.004490281	9.63	0.000	1.91	0.002
Barium	87.05	0.0004	0.03482	0.012594	0.127	0.001599406	1	0.955	0.038135504	51	0.001	5.1	0.007
Beryllium	3.1	0.0004	0.00124	0.00225	0.127	0.00028575	1	0.955	0.001597644	6.2	0.000	0.62	0.003
Cadmium	2.2	0.0004	0.00088	0.039712	0.127	0.005043394	1	0.955	0.006202507	2.3	0.003	0.23	0.027
Cobalt	59.75	0.0004	0.0239	0.051567	0.127	0.006548967	1	0.955	0.031883735	20	0.002	5	0.006
Copper	27.5	0.0004	0.011	0.050829	0.127	0.006455335	1	0.955	0.018277838	35.4	0.001	24.3	0.001
Manganese	2965	0.0004	1.186	71.524	0.127	9.083548	1	0.955	10.7534534	268	0.040	83	0.130
Nickel	155.75	0.0004	0.0623	1.103	0.127	0.140081	1	0.955	0.211917277	42.1	0.005	23.1	0.009
Selenium	2.815	0.0004	0.001126	0.0005	0.127	0.0000635	1	0.955	0.00124555	0.25	0.005	0.025	0.050
Silver	0.215	0.0004	0.000086	0.004684	0.127	0.000594916	1	0.955	0.000713001	2.7	0.000	0.27	0.003
Uranium	1892	0.0004	0.7568	0.366	0.127	0.046482	1	0.955	0.841132984	5	0.168	0.5	**1.682**
Vanadium	14.1525	0.0004	0.005661	0.002003	0.127	0.000254423	1	0.955	0.006194161	2.1	0.003	0.21	0.029
Zinc	357.5	0.0004	0.143	1.16	0.127	0.14732	1	0.955	0.304	225	0.001	22.5	0.014

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 20. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00276	0.001518	0.00025	0.064	0.000016	1	1.14	0.001345614	NS	N/A	NS	N/A
Arsenic	9.85	0.00276	0.027186	0.0027419	0.064	0.00017548	1	1.14	0.024001298	22.8	0.00	5.7	0.00
Barium	87.05	0.00276	0.240258	0.0125938	0.064	0.000806	1	1.14	0.211459649	416.5	0.00	208.3	0.00
Beryllium	3.1	0.00276	0.008556	0.00225	0.064	0.000144	1	1.14	0.007631579	NS	N/A	NS	N/A
Cadmium	2.2	0.00276	0.006072	0.0397118	0.064	0.002541553	1	1.14	0.007555748	3.4	0.00	0.85	0.01
Cobalt	59.75	0.00276	0.16491	0.0515667	0.064	0.003300267	1	1.14	0.147552865	43.9	0.00	23.1	0.01
Copper	27.5	0.00276	0.0759	0.0508294	0.064	0.003253082	1	1.14	0.069432528	33.2	0.00	26.9	0.00
Manganese	2965	0.00276	8.1834	71.524	0.064	4.577536	1	1.14	11.19380351	9770	0.00	977	0.01
Nickel	155.75	0.00276	0.42987	1.103	0.064	0.070592	1	1.14	0.439001754	79	0.01	57.2	0.01
Selenium	2.815	0.00276	0.0077694	0.0005	0.064	0.000032	1	1.14	0.006843333	0.8	0.01	0.4	0.02
Silver	0.215	0.00276	0.0005934	0.0046844	0.064	0.0002998	1	1.14	0.000783509	39.7	0.00	3.97	0.00
Uranium	1892	0.00276	5.22192	0.366	0.064	0.023424	1	1.14	4.601178947	1,600	0.00	160	0.03
Vanadium	14.1525	0.00276	0.0390609	0.0020033	0.064	0.000128213	1	1.14	0.034376415	114	0.00	11.4	0.00
Zinc	357.5	0.00276	0.9867	1.16	0.064	0.07424	1	1.14	0.930649123	224	0.00	10.5	0.09

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 26. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00496	0.002728	0.00025	0.0131	0.000003275	1	0.1064	0.025669878	NS	N/A	NS	N/A
Arsenic	9.85	0.00496	0.048856	0.002742	0.0131	3.59186E-05	1	0.1064	0.459510513	22.8	0.02	5.7	0.08
Barium	87.05	0.00496	0.431768	0.012594	0.0131	0.000164978	1	0.1064	4.059520471	416.5	0.01	208.3	0.02
Beryllium	3.1	0.00496	0.015376	0.00225	0.0131	0.000029475	1	0.1064	0.144788299	NS	N/A	NS	N/A
Cadmium	2.2	0.00496	0.010912	0.039712	0.0131	0.000520224	1	0.1064	0.107445715	3.4	0.03	0.85	0.13
Cobalt	59.75	0.00496	0.29636	0.051567	0.0131	0.000675523	1	0.1064	2.791687249	43.9	0.06	23.1	0.12
Copper	27.5	0.00496	0.1364	0.050829	0.0131	0.000665865	1	0.1064	1.28821302	33.2	0.04	26.9	0.05
Manganese	2965	0.00496	14.7064	71.524	0.0131	0.9369644	1	0.1064	147.0241015	9770	0.02	977	0.15
Nickel	155.75	0.00496	0.77252	1.103	0.0131	0.0144493	1	0.1064	7.396328008	79	0.09	57.2	0.13
Selenium	2.815	0.00496	0.0139624	0.0005	0.0131	0.00000655	1	0.1064	0.131287124	0.8	0.16	0.4	0.33
Silver	0.215	0.00496	0.0010664	0.004684	0.0131	6.13653E-05	1	0.1064	0.010599298	39.7	0.00	3.97	0.00
Uranium	1892	0.00496	9.38432	0.366	0.0131	0.0047946	1	0.1064	88.24355827	1,600	0.06	160	0.55
Vanadium	14.1525	0.00496	0.0701964	0.002003	0.0131	2.62437E-05	1	0.1064	0.659987253	114	0.01	11.4	0.06
Zinc	357.5	0.00496	1.7732	1.16	0.0131	0.015196	1	0.1064	16.80823308	224	0.08	10.5	**1.60**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 20. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00469	0.0025795	0.00025	0.537	0.00013425	1	6.55	0.000414313	0.62	0.00	0.062	0.01
Arsenic	9.85	0.00469	0.0461965	0.002742	0.537	0.001472387	1	6.55	0.007277693	9.63	0.00	1.91	0.00
Barium	87.05	0.00469	0.4082645	0.012594	0.537	0.006762844	1	6.55	0.063362953	51	0.00	5.1	0.01
Beryllium	3.1	0.00469	0.014539	0.00225	0.537	0.00120825	1	6.55	0.00240416	6.2	0.00	0.62	0.00
Cadmium	2.2	0.00469	0.010318	0.039712	0.537	0.021325218	1	6.55	0.004831026	2.3	0.00	0.23	0.02
Cobalt	59.75	0.00469	0.2802275	0.051567	0.537	0.0276913	1	6.55	0.047010504	20	0.00	5	0.01
Copper	27.5	0.00469	0.128975	0.050829	0.537	0.027295394	1	6.55	0.023858075	35.4	0.00	24.3	0.00
Manganese	2965	0.00469	13.90585	71.524	0.537	38.408388	1	6.55	7.986906565	268	0.03	83	0.10
Nickel	155.75	0.00469	0.7304675	1.103	0.537	0.592311	1	6.55	0.201950916	42.1	0.00	23.1	0.01
Selenium	2.815	0.00469	0.01320235	0.0005	0.537	0.0002685	1	6.55	0.002056618	0.25	0.01	0.025	0.08
Silver	0.215	0.00469	0.00100835	0.004684	0.537	0.002515509	1	6.55	0.000537994	2.7	0.00	0.27	0.00
Uranium	1892	0.00469	8.87348	0.366	0.537	0.196542	1	6.55	1.384736183	5	0.28	0.5	**2.77**
Vanadium	14.1525	0.00469	0.066375225	0.002003	0.537	0.00107579	1	6.55	0.010297865	2.1	0.00	0.21	0.05
Zinc	357.5	0.00469	1.676675	1.16	0.537	0.62292	1	6.55	0.351083206	225	0.00	22.5	0.02

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level

TABLE PC 16. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00369	0.0020295	0.00025	0.116	0.000029	1	1.191	0.00172838	0.62	0.00	0.062	0.03
Arsenic	9.85	0.00369	0.0363465	0.002742	0.116	0.000318058	1	1.191	0.030784683	9.63	0.00	1.91	0.02
Barium	87.05	0.00369	0.3212145	0.012594	0.116	0.001460875	1	1.191	0.270928107	51	0.01	5.1	0.05
Beryllium	3.1	0.00369	0.011439	0.00225	0.116	0.000261	1	1.191	0.009823678	6.2	0.00	0.62	0.02
Cadmium	2.2	0.00369	0.008118	0.039712	0.116	0.004606565	1	1.191	0.010683933	2.3	0.00	0.23	0.05
Cobalt	59.75	0.00369	0.2204775	0.051567	0.116	0.005981733	1	1.191	0.190142093	20	0.01	5	0.04
Copper	27.5	0.00369	0.101475	0.050829	0.116	0.005896212	1	1.191	0.090152151	35.4	0.00	24.3	0.00
Manganese	2965	0.00369	10.94085	71.524	0.116	8.296784	1	1.191	16.15250546	268	0.06	83	0.19
Nickel	155.75	0.00369	0.5747175	1.103	0.116	0.127948	1	1.191	0.589979429	42.1	0.01	23.1	0.03
Selenium	2.815	0.00369	0.01038735	0.0005	0.116	0.000058	1	1.191	0.008770235	0.25	0.04	0.025	0.35
Silver	0.215	0.00369	0.00079335	0.004684	0.116	0.000543388	1	1.191	0.001122366	2.7	0.00	0.27	0.00
Uranium	1892	0.00369	6.98148	0.366	0.116	0.042456	1	1.191	5.897511335	5	**1.18**	0.5	**11.80**
Vanadium	14.1525	0.00369	0.052222725	0.002003	0.116	0.000232387	1	1.191	0.044042915	2.1	0.02	0.21	0.21
Zinc	357.5	0.00369	1.319175	1.16	0.116	0.13456	1	1.191	1.220600336	225	0.01	22.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 26. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127		1	0.955					
Antimony	0.6	0.0004	0.00024	0.0025	0.127	0.0003175	1	0.955	0.00058377	0.62	0.001	0.062	0.009
Arsenic	12.8	0.0004	0.00512	0.003	0.127	0.000381	1	0.955	0.005760209	9.63	0.001	1.91	0.003
Barium	79.9	0.0004	0.03196	0.0206	0.127	0.0026162	1	0.955	0.036205445	51	0.001	5.1	0.007
Beryllium	0.37	0.0004	0.000148	0.00065	0.127	0.00008255	1	0.955	0.000241414	6.2	0.000	0.62	0.000
Cadmium	0.12	0.0004	0.000048	0.0005	0.127	0.0000635	1	0.955	0.000116754	2.3	0.000	0.23	0.001
Cobalt	6.9	0.0004	0.00276	0.0005	0.127	0.0000635	1	0.955	0.002956545	20	0.000	5	0.001
Copper	11.3	0.0004	0.00452	0.0086	0.127	0.0010922	1	0.955	0.005876649	35.4	0.000	24.3	0.000
Manganese	274	0.0004	0.1096	0.0183	0.127	0.0023241	1	0.955	0.11719801	268	0.000	83	0.001
Nickel	11.5	0.0004	0.0046	0.0005	0.127	0.0000635	1	0.955	0.004883246	42.1	0.000	23.1	0.000
Selenium	0.475	0.0004	0.00019	0.002	0.127	0.000254	1	0.955	0.000464921	0.25	0.002	0.025	0.019
Silver	0.24	0.0004	0.000096	0.001	0.127	0.000127	1	0.955	0.000233508	2.7	0.000	0.27	0.001
Uranium	2.6	0.0004	0.00104	0.0005	0.127	0.0000635	1	0.955	0.001155497	5	0.000	0.5	0.002
Vanadium	25.1	0.0004	0.01004	0.0005	0.127	0.0000635	1	0.955	0.010579581	2.1	0.005	0.21	0.050
Zinc	154	0.0004	0.0616	0.058	0.127	0.007366	1	0.955	0.072215707	225	0.000	22.5	0.003

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight

TABLE PK 26. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00276	0.001656	0.0025	0.064	0.00016	1	1.14	0.001592982	NS	N/A	NS	N/A
Arsenic	12.8	0.00276	0.035328	0.003	0.064	0.000192	1	1.14	0.031157895	22.8	0.00	5.7	0.01
Barium	79.9	0.00276	0.220524	0.0206	0.064	0.0013184	1	1.14	0.194598596	416.5	0.00	208.3	0.00
Beryllium	0.37	0.00276	0.0010212	0.00065	0.064	0.0000416	1	1.14	0.000932281	NS	N/A	NS	N/A
Cadmium	0.12	0.00276	0.0003312	0.0005	0.064	0.000032	1	1.14	0.000318596	3.4	0.00	0.85	0.00
Cobalt	6.9	0.00276	0.019044	0.0005	0.064	0.000032	1	1.14	0.016733333	43.9	0.00	23.1	0.00
Copper	11.3	0.00276	0.031188	0.0086	0.064	0.0005504	1	1.14	0.027840702	33.2	0.00	26.9	0.00
Manganese	274	0.00276	0.75624	0.0183	0.064	0.0011712	1	1.14	0.664395789	9770	0.00	977	0.00
Nickel	11.5	0.00276	0.03174	0.0005	0.064	0.000032	1	1.14	0.027870175	79	0.00	57.2	0.00
Selenium	0.475	0.00276	0.001311	0.002	0.064	0.000128	1	1.14	0.001262281	0.8	0.00	0.4	0.00
Silver	0.24	0.00276	0.0006624	0.001	0.064	0.000064	1	1.14	0.000637193	39.7	0.00	3.97	0.00
Uranium	2.6	0.00276	0.007176	0.0005	0.064	0.000032	1	1.14	0.006322807	1,600	0.00	160	0.00
Vanadium	25.1	0.00276	0.069276	0.0005	0.064	0.000032	1	1.14	0.060796491	114	0.00	11.4	0.01
Zinc	154	0.00276	0.42504	0.058	0.064	0.003712	1	1.14	0.376098246	224	0.00	10.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 32. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00496	0.002976	0.0025	0.0131	0.00003275	1	0.1064	0.028277726	NS	N/A	NS	N/A
Arsenic	12.8	0.00496	0.063488	0.003	0.0131	0.0000393	1	0.1064	0.59706109	22.8	0.03	5.7	0.10
Barium	79.9	0.00496	0.396304	0.0206	0.0131	0.00026986	1	0.1064	3.727197932	416.5	0.01	208.3	0.02
Beryllium	0.37	0.00496	0.0018352	0.00065	0.0131	0.000008515	1	0.1064	0.017328148	NS	N/A	NS	N/A
Cadmium	0.12	0.00496	0.0005952	0.0005	0.0131	0.00000655	1	0.1064	0.005655545	3.4	0.00	0.85	0.01
Cobalt	6.9	0.00496	0.034224	0.0005	0.0131	0.00000655	1	0.1064	0.321715695	43.9	0.01	23.1	0.01
Copper	11.3	0.00496	0.056048	0.0086	0.0131	0.00011266	1	0.1064	0.527825752	33.2	0.02	26.9	0.02
Manganese	274	0.00496	1.35904	0.0183	0.0131	0.00023973	1	0.1064	12.77518543	9770	0.00	977	0.01
Nickel	11.5	0.00496	0.05704	0.0005	0.0131	0.00000655	1	0.1064	0.536151786	79	0.01	57.2	0.01
Selenium	0.475	0.00496	0.002356	0.002	0.0131	0.0000262	1	0.1064	0.022389098	0.8	0.03	0.4	0.06
Silver	0.24	0.00496	0.0011904	0.001	0.0131	0.0000131	1	0.1064	0.01131109	39.7	0.00	3.97	0.00
Uranium	2.6	0.00496	0.012896	0.0005	0.0131	0.00000655	1	0.1064	0.121264568	1,600	0.00	160	0.00
Vanadium	25.1	0.00496	0.124496	0.0005	0.0131	0.00000655	1	0.1064	1.170136748	114	0.01	11.4	0.10
Zinc	154	0.00496	0.76384	0.058	0.0131	0.0007598	1	0.1064	7.186088346	224	0.03	10.5	0.68

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 26. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00469	0.002814	0.0025	0.537	0.0013425	1	6.55	0.00063458	0.62	0.00	0.062	0.01
Arsenic	12.8	0.00469	0.060032	0.003	0.537	0.001611	1	6.55	0.009411145	9.63	0.00	1.91	0.00
Barium	79.9	0.00469	0.374731	0.0206	0.537	0.0110622	1	6.55	0.058899725	51	0.00	5.1	0.01
Beryllium	0.37	0.00469	0.0017353	0.00065	0.537	0.00034905	1	6.55	0.000318221	6.2	0.00	0.62	0.00
Cadmium	0.12	0.00469	0.0005628	0.0005	0.537	0.0002685	1	6.55	0.000126916	2.3	0.00	0.23	0.00
Cobalt	6.9	0.00469	0.032361	0.0005	0.537	0.0002685	1	6.55	0.004981603	20	0.00	5	0.00
Copper	11.3	0.00469	0.052997	0.0086	0.537	0.0046182	1	6.55	0.008796214	35.4	0.00	24.3	0.00
Manganese	274	0.00469	1.28506	0.0183	0.537	0.0098271	1	6.55	0.197692687	268	0.00	83	0.00
Nickel	11.5	0.00469	0.053935	0.0005	0.537	0.0002685	1	6.55	0.008275344	42.1	0.00	23.1	0.00
Selenium	0.475	0.00469	0.00222775	0.002	0.537	0.001074	1	6.55	0.000504084	0.25	0.00	0.025	0.02
Silver	0.24	0.00469	0.0011256	0.001	0.537	0.000537	1	6.55	0.000253832	2.7	0.00	0.27	0.00
Uranium	2.6	0.00469	0.012194	0.0005	0.537	0.0002685	1	6.55	0.001902672	5	0.00	0.5	0.00
Vanadium	25.1	0.00469	0.117719	0.0005	0.537	0.0002685	1	6.55	0.018013359	2.1	0.01	0.21	0.09
Zinc	154	0.00469	0.72226	0.058	0.537	0.031146	1	6.55	0.115023817	225	0.00	22.5	0.01

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level

TABLE PC 22. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00369	0.002214	0.0025	0.116	0.00029	1	1.191	0.002102435	0.62	0.00	0.062	0.03
Arsenic	12.8	0.00369	0.047232	0.003	0.116	0.000348	1	1.191	0.039949622	9.63	0.00	1.91	0.02
Barium	79.9	0.00369	0.294831	0.0206	0.116	0.0023896	1	1.191	0.2495555	51	0.00	5.1	0.05
Beryllium	0.37	0.00369	0.0013653	0.00065	0.116	0.0000754	1	1.191	0.001209656	6.2	0.00	0.62	0.00
Cadmium	0.12	0.00369	0.0004428	0.0005	0.116	0.000058	1	1.191	0.000420487	2.3	0.00	0.23	0.00
Cobalt	6.9	0.00369	0.025461	0.0005	0.116	0.000058	1	1.191	0.021426532	20	0.00	5	0.00
Copper	11.3	0.00369	0.041697	0.0086	0.116	0.0009976	1	1.191	0.035847691	35.4	0.00	24.3	0.00
Manganese	274	0.00369	1.01106	0.0183	0.116	0.0021228	1	1.191	0.850699244	268	0.00	83	0.01
Nickel	11.5	0.00369	0.042435	0.0005	0.116	0.000058	1	1.191	0.035678421	42.1	0.00	23.1	0.00
Selenium	0.475	0.00369	0.00175275	0.002	0.116	0.000232	1	1.191	0.001666457	0.25	0.01	0.025	0.07
Silver	0.24	0.00369	0.0008856	0.001	0.116	0.000116	1	1.191	0.000840974	2.7	0.00	0.27	0.00
Uranium	2.6	0.00369	0.009594	0.0005	0.116	0.000058	1	1.191	0.008104114	5	0.00	0.5	0.02
Vanadium	25.1	0.00369	0.092619	0.0005	0.116	0.000058	1	1.191	0.077814442	2.1	0.04	0.21	0.37
Zinc	154	0.00369	0.56826	0.058	0.116	0.006728	1	1.191	0.482777498	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 25. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127		1	0.955					
Antimony	0.65	0.0004	0.00026	0.002817	0.127	0.000357717	1	0.955	0.000646824	0.62	0.001	0.062	0.010
Arsenic	9.2	0.0004	0.00368	0.002128	0.127	0.000270228	1	0.955	0.004136364	9.63	0.000	1.91	0.002
Barium	79.925	0.0004	0.03197	0.041011	0.127	0.005208411	1	0.955	0.038930273	51	0.001	5.1	0.008
Beryllium	0.755	0.0004	0.000302	0.00005	0.127	0.00000635	1	0.955	0.00032288	6.2	0.000	0.62	0.001
Cadmium	0.35375	0.0004	0.0001415	0.00085	0.127	0.00010795	1	0.955	0.000261204	2.3	0.000	0.23	0.001
Cobalt	8.375	0.0004	0.00335	0.000662	0.127	8.41022E-05	1	0.955	0.003595919	20	0.000	5	0.001
Copper	12.05	0.0004	0.00482	0.005144	0.127	0.000653344	1	0.955	0.005731251	35.4	0.000	24.3	0.000
Manganese	1328	0.0004	0.5312	0.062622	0.127	0.007953022	1	0.955	0.564558138	268	0.002	83	0.007
Nickel	22.8	0.0004	0.00912	0.003728	0.127	0.000473428	1	0.955	0.010045474	42.1	0.000	23.1	0.000
Selenium	0.55	0.0004	0.00022	0.0005	0.127	0.0000635	1	0.955	0.000296859	0.25	0.001	0.025	0.012
Silver	0.265	0.0004	0.000106	0.00035	0.127	0.00004445	1	0.955	0.000157539	2.7	0.000	0.27	0.001
Uranium	15.945	0.0004	0.006378	0.015325	0.127	0.001946275	1	0.955	0.008716518	5	0.002	0.5	0.017
Vanadium	19.7	0.0004	0.00788	0.002061	0.127	0.000261761	1	0.955	0.008525404	2.1	0.004	0.21	0.041
Zinc	68.5	0.0004	0.0274	0.022944	0.127	0.002913944	1	0.955	0.03174235	225	0.000	22.5	0.001

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 25. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00276	0.001794	0.0028167	0.064	0.000180267	1	1.14	0.001731813	NS	N/A	NS	N/A
Arsenic	9.2	0.00276	0.025392	0.0021278	0.064	0.000136178	1	1.14	0.022393138	22.8	0.00	5.7	0.00
Barium	79.925	0.00276	0.220593	0.0410111	0.064	0.002624711	1	1.14	0.19580501	416.5	0.00	208.3	0.00
Beryllium	0.755	0.00276	0.0020838	0.00005	0.064	0.0000032	1	1.14	0.001830702	NS	N/A	NS	N/A
Cadmium	0.35375	0.00276	0.00097635	0.00085	0.064	0.0000544	1	1.14	0.000904167	3.4	0.00	0.85	0.00
Cobalt	8.375	0.00276	0.023115	0.0006622	0.064	4.23822E-05	1	1.14	0.020313493	43.9	0.00	23.1	0.00
Copper	12.05	0.00276	0.033258	0.0051444	0.064	0.000329244	1	1.14	0.029462495	33.2	0.00	26.9	0.00
Manganese	1328	0.00276	3.66528	0.0626222	0.064	0.004007822	1	1.14	3.218673528	9770	0.00	977	0.00
Nickel	22.8	0.00276	0.062928	0.0037278	0.064	0.000238578	1	1.14	0.055409279	79	0.00	57.2	0.00
Selenium	0.55	0.00276	0.001518	0.0005	0.064	0.000032	1	1.14	0.001359649	0.8	0.00	0.4	0.00
Silver	0.265	0.00276	0.0007314	0.00035	0.064	0.0000224	1	1.14	0.000661228	39.7	0.00	3.97	0.00
Uranium	15.945	0.00276	0.0440082	0.015325	0.064	0.0009808	1	1.14	0.039464035	1,600	0.00	160	0.00
Vanadium	19.7	0.00276	0.054372	0.0020611	0.064	0.000131911	1	1.14	0.047810448	114	0.00	11.4	0.00
Zinc	68.5	0.00276	0.18906	0.0229444	0.064	0.001468444	1	1.14	0.167130214	224	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 31. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00496	0.003224	0.002817	0.0131	3.68983E-05	1	0.1064	0.030647541	NS	N/A	NS	N/A
Arsenic	9.2	0.00496	0.045632	0.002128	0.0131	2.78739E-05	1	0.1064	0.429134153	22.8	0.02	5.7	0.08
Barium	79.925	0.00496	0.396428	0.041011	0.0131	0.000537246	1	0.1064	3.730876368	416.5	0.01	208.3	0.02
Beryllium	0.755	0.00496	0.0037448	0.00005	0.0131	0.000000655	1	0.1064	0.035201645	NS	N/A	NS	N/A
Cadmium	0.35375	0.00496	0.0017546	0.00085	0.0131	0.000011135	1	0.1064	0.016595254	3.4	0.00	0.85	0.02
Cobalt	8.375	0.00496	0.04154	0.000662	0.0131	8.67511E-06	1	0.1064	0.390495067	43.9	0.01	23.1	0.02
Copper	12.05	0.00496	0.059768	0.005144	0.0131	6.73922E-05	1	0.1064	0.562362709	33.2	0.02	26.9	0.02
Manganese	1328	0.00496	6.58688	0.062622	0.0131	0.000820351	1	0.1064	61.91447698	9770	0.01	977	0.06
Nickel	22.8	0.00496	0.113088	0.003728	0.0131	4.88339E-05	1	0.1064	1.063316108	79	0.01	57.2	0.02
Selenium	0.55	0.00496	0.002728	0.0005	0.0131	0.00000655	1	0.1064	0.025700658	0.8	0.03	0.4	0.06
Silver	0.265	0.00496	0.0013144	0.00035	0.0131	0.000004585	1	0.1064	0.012396476	39.7	0.00	3.97	0.00
Uranium	15.945	0.00496	0.0790872	0.015325	0.0131	0.000200758	1	0.1064	0.74518757	1,600	0.00	160	0.00
Vanadium	19.7	0.00496	0.097712	0.002061	0.0131	2.70006E-05	1	0.1064	0.918599629	114	0.01	11.4	0.08
Zinc	68.5	0.00496	0.33976	0.022944	0.0131	0.000300572	1	0.1064	3.19605801	224	0.01	10.5	0.30

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
N/A:	Value could not be calculated with the information available

TABLE PG 25. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00469	0.0030485	0.002817	0.537	0.00151255	1	6.55	0.000696344	0.62	0.00	0.062	0.01
Arsenic	9.2	0.00469	0.043148	0.002128	0.537	0.001142617	1	6.55	0.006761926	9.63	0.00	1.91	0.00
Barium	79.925	0.00469	0.37484825	0.041011	0.537	0.022022967	1	6.55	0.060591025	51	0.00	5.1	0.01
Beryllium	0.755	0.00469	0.00354095	0.00005	0.537	0.00002685	1	6.55	0.000544702	6.2	0.00	0.62	0.00
Cadmium	0.35375	0.00469	0.001659088	0.00085	0.537	0.00045645	1	6.55	0.000322983	2.3	0.00	0.23	0.00
Cobalt	8.375	0.00469	0.03927875	0.000662	0.537	0.000355613	1	6.55	0.006051048	20	0.00	5	0.00
Copper	12.05	0.00469	0.0565145	0.005144	0.537	0.002762567	1	6.55	0.009049934	35.4	0.00	24.3	0.00
Manganese	1328	0.00469	6.22832	0.062622	0.537	0.033628133	1	6.55	0.956022616	268	0.00	83	0.01
Nickel	22.8	0.00469	0.106932	0.003728	0.537	0.002001817	1	6.55	0.016631117	42.1	0.00	23.1	0.00
Selenium	0.55	0.00469	0.0025795	0.0005	0.537	0.0002685	1	6.55	0.000434809	0.25	0.00	0.025	0.02
Silver	0.265	0.00469	0.00124285	0.00035	0.537	0.00018795	1	6.55	0.000218443	2.7	0.00	0.27	0.00
Uranium	15.945	0.00469	0.07478205	0.015325	0.537	0.008229525	1	6.55	0.012673523	5	0.00	0.5	0.03
Vanadium	19.7	0.00469	0.092393	0.002061	0.537	0.001106817	1	6.55	0.014274781	2.1	0.01	0.21	0.07
Zinc	68.5	0.00469	0.321265	0.022944	0.537	0.012321167	1	6.55	0.050929186	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 21. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00369	0.0023985	0.0028167	0.116	0.000326733	1	1.191	0.002288189	0.62	0.00	0.062	0.04
Arsenic	9.2	0.00369	0.033948	0.0021278	0.116	0.000246822	1	1.191	0.028711018	9.63	0.00	1.91	0.02
Barium	79.925	0.00369	0.29492325	0.0410111	0.116	0.004757289	1	1.191	0.251620939	51	0.00	5.1	0.05
Beryllium	0.755	0.00369	0.00278595	0.00005	0.116	0.0000058	1	1.191	0.002344039	6.2	0.00	0.62	0.00
Cadmium	0.35375	0.00369	0.001305338	0.00085	0.116	0.0000986	1	1.191	0.001178789	2.3	0.00	0.23	0.01
Cobalt	8.375	0.00369	0.03090375	0.0006622	0.116	7.68178E-05	1	1.191	0.026012232	20	0.00	5	0.01
Copper	12.05	0.00369	0.0444645	0.0051444	0.116	0.000596756	1	1.191	0.037834807	35.4	0.00	24.3	0.00
Manganese	1328	0.00369	4.90032	0.0626222	0.116	0.007264178	1	1.191	4.120557664	268	0.02	83	0.05
Nickel	22.8	0.00369	0.084132	0.0037278	0.116	0.000432422	1	1.191	0.071002873	42.1	0.00	23.1	0.00
Selenium	0.55	0.00369	0.0020295	0.0005	0.116	0.000058	1	1.191	0.001752729	0.25	0.01	0.025	0.07
Silver	0.265	0.00369	0.00097785	0.00035	0.116	0.0000406	1	1.191	0.000855122	2.7	0.00	0.27	0.00
Uranium	15.945	0.00369	0.05883705	0.015325	0.116	0.0017777	1	1.191	0.050893997	5	0.01	0.5	0.10
Vanadium	19.7	0.00369	0.072693	0.0020611	0.116	0.000239089	1	1.191	0.061236011	2.1	0.03	0.21	0.29
Zinc	68.5	0.00369	0.252765	0.0229444	0.116	0.002661556	1	1.191	0.214463943	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 22. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.20	0.0004	0.00048	0.001792	0.127	0.000227542	1	0.955	0.000740881	0.62	0.001	0.062	0.012
Arsenic	9.50	0.0004	0.0038	0.002313	0.127	0.000293793	1	0.955	0.004286695	9.63	0.000	1.91	0.002
Barium	183.43	0.0004	0.07337	0.04468	0.127	0.00567436	1	0.955	0.082768963	51	0.002	5.1	0.016
Beryllium	2.01	0.0004	0.000805	0.00005	0.127	0.00000635	1	0.955	0.000849581	6.2	0.000	0.62	0.001
Cadmium	6.13	0.0004	0.00245	0.001338	0.127	0.000169942	1	0.955	0.002743395	2.3	0.001	0.23	0.012
Cobalt	23.21	0.0004	0.009283	0.00065	0.127	0.00008255	1	0.955	0.009806859	20	0.000	5	0.002
Copper	16.43	0.0004	0.00657	0.010444	0.127	0.001326356	1	0.955	0.008268436	35.4	0.000	24.3	0.000
Manganese	16285.00	0.0004	6.514	1.846	0.127	0.234442	1	0.955	7.066431414	268	0.026	83	0.085
Nickel	184.25	0.0004	0.0737	0.047067	0.127	0.005977467	1	0.955	0.083431902	42.1	0.002	23.1	0.004
Selenium	9.05	0.0004	0.00362	0.0005	0.127	0.0000635	1	0.955	0.003857068	0.25	0.015	0.025	0.154
Silver	0.30	0.0004	0.000119	0.01	0.127	0.00127	1	0.955	0.00145445	2.7	0.001	0.27	0.005
Uranium	52.10	0.0004	0.02084	0.04926	0.127	0.00625602	1	0.955	0.028372796	5	0.006	0.5	0.057
Vanadium	31.40	0.0004	0.01256	0.00043	0.127	0.00005461	1	0.955	0.013209016	2.1	0.006	0.21	0.063
Zinc	238.50	0.0004	0.0954	0.047844	0.127	0.006076156	1	0.955	0.106257755	225	0.000	22.5	0.005

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 22. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.20	0.00276	0.003312	0.0017917	0.064	0.000114667	1	1.14	0.003005848	NS	N/A	NS	N/A
Arsenic	9.50	0.00276	0.02622	0.0023133	0.064	0.000148053	1	1.14	0.023129871	22.8	0.00	5.7	0.00
Barium	183.43	0.00276	0.506253	0.04468	0.064	0.00285952	1	1.14	0.44658993	416.5	0.00	208.3	0.00
Beryllium	2.01	0.00276	0.0055545	0.00005	0.064	0.0000032	1	1.14	0.004875175	NS	N/A	NS	N/A
Cadmium	6.13	0.00276	0.016905	0.0013381	0.064	0.00008564	1	1.14	0.01490407	3.4	0.00	0.85	0.02
Cobalt	23.21	0.00276	0.0640527	0.00065	0.064	0.0000416	1	1.14	0.05622307	43.9	0.00	23.1	0.00
Copper	16.43	0.00276	0.045333	0.0104438	0.064	0.0006684	1	1.14	0.040352105	33.2	0.00	26.9	0.00
Manganese	16285.00	0.00276	44.9466	1.846	0.064	0.118144	1	1.14	39.53047719	9770	0.00	977	0.04
Nickel	184.25	0.00276	0.50853	0.0470667	0.064	0.003012267	1	1.14	0.448721287	79	0.01	57.2	0.01
Selenium	9.05	0.00276	0.024978	0.0005	0.064	0.000032	1	1.14	0.021938596	0.8	0.03	0.4	0.05
Silver	0.30	0.00276	0.0008211	0.01	0.064	0.00064	1	1.14	0.001281667	39.7	0.00	3.97	0.00
Uranium	52.10	0.00276	0.143796	0.04926	0.064	0.00315264	1	1.14	0.128902316	1,600	0.00	160	0.00
Vanadium	31.40	0.00276	0.086664	0.00043	0.064	0.00002752	1	1.14	0.076045193	114	0.00	11.4	0.01
Zinc	238.50	0.00276	0.65826	0.0478438	0.064	0.003062	1	1.14	0.580107018	224	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 28. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.20	0.00496	0.005952	0.001792	0.0131	2.34708E-05	1	0.1064	0.05616044	NS	N/A	NS	N/A
Arsenic	9.50	0.00496	0.04712	0.002313	0.0131	3.03047E-05	1	0.1064	0.443141961	22.8	0.02	5.7	0.08
Barium	183.43	0.00496	0.909788	0.04468	0.0131	0.000585308	1	0.1064	8.556140113	416.5	0.02	208.3	0.04
Beryllium	2.01	0.00496	0.009982	0.00005	0.0131	0.000000655	1	0.1064	0.093821945	NS	N/A	NS	N/A
Cadmium	6.13	0.00496	0.03038	0.001338	0.0131	1.75294E-05	1	0.1064	0.285691066	3.4	0.08	0.85	0.34
Cobalt	23.21	0.00496	0.1151092	0.00065	0.0131	0.000008515	1	0.1064	1.081933412	43.9	0.02	23.1	0.05
Copper	16.43	0.00496	0.081468	0.010444	0.0131	0.000136813	1	0.1064	0.766962529	33.2	0.02	26.9	0.03
Manganese	16285.00	0.00496	80.7736	1.846	0.0131	0.0241826	1	0.1064	759.377656	9770	0.08	977	0.78
Nickel	184.25	0.00496	0.91388	0.047067	0.0131	0.000616573	1	0.1064	8.594892607	79	0.11	57.2	0.15
Selenium	9.05	0.00496	0.044888	0.0005	0.0131	0.00000655	1	0.1064	0.421941259	0.8	0.53	0.4	**1.05**
Silver	0.30	0.00496	0.0014756	0.01	0.0131	0.000131	1	0.1064	0.015099624	39.7	0.00	3.97	0.00
Uranium	52.10	0.00496	0.258416	0.04926	0.0131	0.000645306	1	0.1064	2.434786711	1,600	0.00	160	0.02
Vanadium	31.40	0.00496	0.155744	0.00043	0.0131	0.000005633	1	0.1064	1.46381234	114	0.01	11.4	0.13
Zinc	238.50	0.00496	1.18296	0.047844	0.0131	0.000626753	1	0.1064	11.12393565	224	0.05	10.5	**1.06**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 22. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.20	0.00469	0.005628	0.001792	0.537	0.000962125	1	6.55	0.001006126	0.62	0.00	0.062	0.02
Arsenic	9.50	0.00469	0.044555	0.002313	0.537	0.00124226	1	6.55	0.006991948	9.63	0.00	1.91	0.00
Barium	183.43	0.00469	0.86026325	0.04468	0.537	0.02399316	1	6.55	0.135000979	51	0.00	5.1	0.03
Beryllium	2.01	0.00469	0.009438625	0.00005	0.537	0.00002685	1	6.55	0.001445111	6.2	0.00	0.62	0.00
Cadmium	6.13	0.00469	0.02872625	0.001338	0.537	0.000718573	1	6.55	0.004495393	2.3	0.00	0.23	0.02
Cobalt	23.21	0.00469	0.108843175	0.00065	0.537	0.00034905	1	6.55	0.016670569	20	0.00	5	0.00
Copper	16.43	0.00469	0.07703325	0.010444	0.537	0.005608294	1	6.55	0.01261703	35.4	0.00	24.3	0.00
Manganese	16285.00	0.00469	76.37665	1.846	0.537	0.991302	1	6.55	11.81190107	268	0.04	83	0.14
Nickel	184.25	0.00469	0.8641325	0.047067	0.537	0.0252748	1	6.55	0.135787374	42.1	0.00	23.1	0.01
Selenium	9.05	0.00469	0.0424445	0.0005	0.537	0.0002685	1	6.55	0.006521069	0.25	0.03	0.025	0.26
Silver	0.30	0.00469	0.001395275	0.01	0.537	0.00537	1	6.55	0.001032866	2.7	0.00	0.27	0.00
Uranium	52.10	0.00469	0.244349	0.04926	0.537	0.02645262	1	6.55	0.041343759	5	0.01	0.5	0.08
Vanadium	31.40	0.00469	0.147266	0.00043	0.537	0.00023091	1	6.55	0.022518612	2.1	0.01	0.21	0.11
Zinc	238.50	0.00469	1.118565	0.047844	0.537	0.025692094	1	6.55	0.17469574	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 18. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.20	0.00369	0.004428	0.001792	0.116	0.000207833	1	1.191	0.003892387	0.62	0.01	0.062	0.06
Arsenic	9.50	0.00369	0.035055	0.002313	0.116	0.000268347	1	1.191	0.029658561	9.63	0.00	1.91	0.02
Barium	183.43	0.00369	0.67683825	0.04468	0.116	0.00518288	1	1.191	0.572645785	51	0.01	5.1	0.11
Beryllium	2.01	0.00369	0.007426125	0.00005	0.116	0.0000058	1	1.191	0.006240071	6.2	0.00	0.62	0.01
Cadmium	6.13	0.00369	0.02260125	0.001338	0.116	0.000155223	1	1.191	0.01910703	2.3	0.01	0.23	0.08
Cobalt	23.21	0.00369	0.085635675	0.00065	0.116	0.0000754	1	1.191	0.071965638	20	0.00	5	0.01
Copper	16.43	0.00369	0.06060825	0.010444	0.116	0.001211475	1	1.191	0.05190573	35.4	0.00	24.3	0.00
Manganese	16285.00	0.00369	60.09165	1.846	0.116	0.214136	1	1.191	50.63458102	268	0.19	83	0.61
Nickel	184.25	0.00369	0.6798825	0.047067	0.116	0.005459733	1	1.191	0.575434285	42.1	0.01	23.1	0.02
Selenium	9.05	0.00369	0.0333945	0.0005	0.116	0.000058	1	1.191	0.028087741	0.25	0.11	0.025	**1.12**
Silver	0.30	0.00369	0.001097775	0.01	0.116	0.00116	1	1.191	0.001895697	2.7	0.00	0.27	0.01
Uranium	52.10	0.00369	0.192249	0.04926	0.116	0.00571416	1	1.191	0.166215919	5	0.03	0.5	0.33
Vanadium	31.40	0.00369	0.115866	0.00043	0.116	0.00004988	1	1.191	0.097326516	2.1	0.05	0.21	0.46
Zinc	238.50	0.00369	0.880065	0.047844	0.116	0.005549875	1	1.191	0.743589316	225	0.00	22.5	0.03

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight

TABLE PH 24. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.60	0.0004	0.00024	0.003233	0.127	0.000410633	1	0.955	0.000681291	0.62	0.001	0.062	0.011
Arsenic	7.96	0.0004	0.003183529	0.002216	0.127	0.000281423	1	0.955	0.003628222	9.63	0.000	1.91	0.002
Barium	76.18	0.0004	0.030470588	0.0451	0.127	0.0057277	1	0.955	0.037903967	51	0.001	5.1	0.007
Beryllium	0.61	0.0004	0.000242118	0.00005	0.127	0.00000635	1	0.955	0.000260176	6.2	0.000	0.62	0.000
Cadmium	1.01	0.0004	0.000402235	0.000752	0.127	9.55566E-05	1	0.955	0.000521248	2.3	0.000	0.23	0.002
Cobalt	12.07	0.0004	0.004828471	0.00025	0.127	0.00003175	1	0.955	0.005089236	20	0.000	5	0.001
Copper	5.09	0.0004	0.002037647	0.005	0.127	0.000635	1	0.955	0.002798583	35.4	0.000	24.3	0.000
Manganese	5,086.47	0.0004	2.034588235	0.169	0.127	0.021463	1	0.955	2.152933231	268	0.008	83	0.026
Nickel	45.26	0.0004	0.018103529	0.008706	0.127	0.001105606	1	0.955	0.020114277	42.1	0.000	23.1	0.001
Selenium	2.75	0.0004	0.001101059	0.0046	0.127	0.0005842	1	0.955	0.001764669	0.25	0.007	0.025	0.071
Silver	0.09	0.0004	0.000036	0.01	0.127	0.00127	1	0.955	0.001367539	2.7	0.001	0.27	0.005
Uranium	16.36	0.0004	0.006543	0.02	0.127	0.00254	1	0.955	0.009510995	5	0.002	0.5	0.019
Vanadium	13.72	0.0004	0.005488	0.001767	0.127	0.000224367	1	0.955	0.005981536	2.1	0.003	0.21	0.028
Zinc	69.55	0.0004	0.027818824	0.017	0.127	0.002159	1	0.955	0.031390391	225	0.000	22.5	0.001

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 24. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.60	0.00276	0.001656	0.0032333	0.064	0.000206933	1	1.14	0.001634152	NS	N/A	NS	N/A
Arsenic	7.96	0.00276	0.021966353	0.0022159	0.064	0.000141819	1	1.14	0.019393134	22.8	0.00	5.7	0.00
Barium	76.18	0.00276	0.210247059	0.0451	0.064	0.0028864	1	1.14	0.186959174	416.5	0.00	208.3	0.00
Beryllium	0.61	0.00276	0.001670612	0.00005	0.064	0.0000032	1	1.14	0.001468256	NS	N/A	NS	N/A
Cadmium	1.01	0.00276	0.002775424	0.0007524	0.064	4.81545E-05	1	1.14	0.002476823	3.4	0.00	0.85	0.00
Cobalt	12.07	0.00276	0.033316447	0.00025	0.064	0.000016	1	1.14	0.029238989	43.9	0.00	23.1	0.00
Copper	5.09	0.00276	0.014059765	0.005	0.064	0.00032	1	1.14	0.012613829	33.2	0.00	26.9	0.00
Manganese	5,086.47	0.00276	14.03865882	0.169	0.064	0.010816	1	1.14	12.32410072	9770	0.00	977	0.01
Nickel	45.26	0.00276	0.124914353	0.0087056	0.064	0.000557156	1	1.14	0.110062727	79	0.00	57.2	0.00
Selenium	2.75	0.00276	0.007597306	0.0046	0.064	0.0002944	1	1.14	0.006922549	0.8	0.01	0.4	0.02
Silver	0.09	0.00276	0.0002484	0.01	0.064	0.00064	1	1.14	0.000779298	39.7	0.00	3.97	0.00
Uranium	16.36	0.00276	0.0451467	0.02	0.064	0.00128	1	1.14	0.040725175	1,600	0.00	160	0.00
Vanadium	13.72	0.00276	0.0378672	0.0017667	0.064	0.000113067	1	1.14	0.033316023	114	0.00	11.4	0.00
Zinc	69.55	0.00276	0.191949882	0.017	0.064	0.001088	1	1.14	0.169331476	224	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 30. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.60	0.00496	0.002976	0.003233	0.0131	4.23567E-05	1	0.1064	0.028368014	NS	N/A	NS	N/A
Arsenic	7.96	0.00496	0.039475765	0.002216	0.0131	2.90286E-05	1	0.1064	0.371285652	22.8	0.02	5.7	0.07
Barium	76.18	0.00496	0.377835294	0.0451	0.0131	0.00059081	1	0.1064	3.556636317	416.5	0.01	208.3	0.02
Beryllium	0.61	0.00496	0.003002259	0.00005	0.0131	0.000000655	1	0.1064	0.028222874	NS	N/A	NS	N/A
Cadmium	1.01	0.00496	0.004987718	0.000752	0.0131	9.85662E-06	1	0.1064	0.046969683	3.4	0.01	0.85	0.06
Cobalt	12.07	0.00496	0.059873035	0.00025	0.0131	0.000003275	1	0.1064	0.562747277	43.9	0.01	23.1	0.02
Copper	5.09	0.00496	0.025266824	0.005	0.0131	0.0000655	1	0.1064	0.238085747	33.2	0.01	26.9	0.01
Manganese	5,086.47	0.00496	25.22889412	0.169	0.0131	0.0022139	1	0.1064	237.1344738	9770	0.02	977	0.24
Nickel	45.26	0.00496	0.224483765	0.008706	0.0131	0.000114043	1	0.1064	2.110881649	79	0.03	57.2	0.04
Selenium	2.75	0.00496	0.013653129	0.0046	0.0131	0.00006026	1	0.1064	0.128885239	0.8	0.16	0.4	0.32
Silver	0.09	0.00496	0.0004464	0.01	0.0131	0.000131	1	0.1064	0.005426692	39.7	0.00	3.97	0.00
Uranium	16.36	0.00496	0.0811332	0.02	0.0131	0.000262	1	0.1064	0.764992481	1,600	0.00	160	0.00
Vanadium	13.72	0.00496	0.0680512	0.001767	0.0131	2.31433E-05	1	0.1064	0.63979646	114	0.01	11.4	0.06
Zinc	69.55	0.00496	0.344953412	0.017	0.0131	0.0002227	1	0.1064	3.244136389	224	0.01	10.5	0.31

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 24. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.60	0.00469	0.002814	0.003233	0.537	0.0017363	1	6.55	0.000694702	0.62	0.00	0.062	0.01
Arsenic	7.96	0.00469	0.037326882	0.002216	0.537	0.001189952	1	6.55	0.005880433	9.63	0.00	1.91	0.00
Barium	76.18	0.00469	0.357267647	0.0451	0.537	0.0242187	1	6.55	0.05824219	51	0.00	5.1	0.01
Beryllium	0.61	0.00469	0.002838829	0.00005	0.537	0.00002685	1	6.55	0.000437508	6.2	0.00	0.62	0.00
Cadmium	1.01	0.00469	0.004716209	0.000752	0.537	0.000404046	1	6.55	0.000781718	2.3	0.00	0.23	0.00
Cobalt	12.07	0.00469	0.056613818	0.00025	0.537	0.00013425	1	6.55	0.008663827	20	0.00	5	0.00
Copper	5.09	0.00469	0.023891412	0.005	0.537	0.002685	1	6.55	0.004057467	35.4	0.00	24.3	0.00
Manganese	5,086.47	0.00469	23.85554706	0.169	0.537	0.090753	1	6.55	3.655923673	268	0.01	83	0.04
Nickel	45.26	0.00469	0.212263882	0.008706	0.537	0.004674883	1	6.55	0.033120422	42.1	0.00	23.1	0.00
Selenium	2.75	0.00469	0.012909915	0.0046	0.537	0.0024702	1	6.55	0.002348109	0.25	0.01	0.025	0.09
Silver	0.09	0.00469	0.0004221	0.01	0.537	0.00537	1	6.55	0.00088429	2.7	0.00	0.27	0.00
Uranium	16.36	0.00469	0.076716675	0.02	0.537	0.01074	1	6.55	0.013352164	5	0.00	0.5	0.03
Vanadium	13.72	0.00469	0.0643468	0.001767	0.537	0.0009487	1	6.55	0.009968779	2.1	0.00	0.21	0.05
Zinc	69.55	0.00469	0.326175706	0.017	0.537	0.009129	1	6.55	0.051191558	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 20. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116		1	1.191					
Antimony	0.60	0.00369	0.002214	0.003233	0.116	0.000375067	1	1.191	0.00217386	0.62	0.00	0.062	0.04
Arsenic	7.96	0.00369	0.029368059	0.002216	0.116	0.000257047	1	1.191	0.024874145	9.63	0.00	1.91	0.01
Barium	76.18	0.00369	0.281091176	0.0451	0.116	0.0052316	1	1.191	0.240405354	51	0.00	5.1	0.05
Beryllium	0.61	0.00369	0.002233535	0.00005	0.116	0.0000058	1	1.191	0.001880214	6.2	0.00	0.62	0.00
Cadmium	1.01	0.00369	0.003710621	0.000752	0.116	8.728E-05	1	1.191	0.003188833	2.3	0.00	0.23	0.01
Cobalt	12.07	0.00369	0.044542641	0.00025	0.116	0.000029	1	1.191	0.037423712	20	0.00	5	0.01
Copper	5.09	0.00369	0.018797294	0.005	0.116	0.00058	1	1.191	0.016269768	35.4	0.00	24.3	0.00
Manganese	5,086.47	0.00369	18.76907647	0.169	0.116	0.019604	1	1.191	15.77555035	268	0.06	83	0.19
Nickel	45.26	0.00369	0.167005059	0.008706	0.116	0.001009844	1	1.191	0.141070448	42.1	0.00	23.1	0.01
Selenium	2.75	0.00369	0.010157268	0.0046	0.116	0.0005336	1	1.191	0.008976379	0.25	0.04	0.025	0.36
Silver	0.09	0.00369	0.0003321	0.01	0.116	0.00116	1	1.191	0.001252813	2.7	0.00	0.27	0.00
Uranium	16.36	0.00369	0.060359175	0.02	0.116	0.00232	1	1.191	0.052627351	5	0.01	0.5	0.11
Vanadium	13.72	0.00369	0.0506268	0.001767	0.116	0.000204933	1	1.191	0.042679877	2.1	0.02	0.21	0.20
Zinc	69.55	0.00369	0.256628647	0.017	0.116	0.001972	1	1.191	0.217129007	225	0.00	22.5	0.01

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight

TABLE PH 18. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.0004	0.00072	0.0029667	0.127	0.000376767	1	0.955	0.001148447	0.62	0.002	0.062	0.019
Arsenic	82.1	0.0004	0.03284	0.0012033	0.127	0.000152823	1	0.955	0.034547459	9.63	0.004	1.91	0.018
Barium	112	0.0004	0.0448	0.0669	0.127	0.0084963	1	0.955	0.055807644	51	0.001	5.1	0.011
Beryllium	0.95	0.0004	0.00038	0.000085	0.127	0.000010795	1	0.955	0.000409209	6.2	0.000	0.62	0.001
Cadmium	0.75	0.0004	0.0003	0.0003733	0.127	4.74133E-05	1	0.955	0.000363784	2.3	0.000	0.23	0.002
Cobalt	23.1	0.0004	0.00924	0.0011667	0.127	0.000148167	1	0.955	0.009830541	20	0.000	5	0.002
Copper	57.5	0.0004	0.023	0.0031	0.127	0.0003937	1	0.955	0.024496021	35.4	0.001	24.3	0.001
Manganese	3090	0.0004	1.236	0.2956667	0.127	0.037549667	1	0.955	1.33355986	268	0.005	83	0.016
Nickel	37.1	0.0004	0.01484	0.0023	0.127	0.0002921	1	0.955	0.015845131	42.1	0.000	23.1	0.001
Selenium	0.6	0.0004	0.00024	0.00065	0.127	0.00008255	1	0.955	0.000337749	0.25	0.001	0.025	0.014
Silver	0.31	0.0004	0.000124	0.0007667	0.127	9.73667E-05	1	0.955	0.000231798	2.7	0.000	0.27	0.001
Uranium	406	0.0004	0.1624	0.1333333	0.127	0.016933333	1	0.955	0.187783595	5	0.038	0.5	0.376
Vanadium	32.8	0.0004	0.01312	0.00025	0.127	0.00003175	1	0.955	0.013771466	2.1	0.007	0.21	0.066
Zinc	142	0.0004	0.0568	0.0047	0.127	0.0005969	1	0.955	0.060101466	225	0.000	22.5	0.003

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 18. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.00276	0.004968	0.0029667	0.064	0.000189867	1	1.14	0.004524444	NS	N/A	NS	N/A
Arsenic	82.1	0.00276	0.226596	0.0012033	0.064	7.70133E-05	1	1.14	0.198835977	22.8	0.01	5.7	0.03
Barium	112	0.00276	0.30912	0.0669	0.064	0.0042816	1	1.14	0.274913684	416.5	0.00	208.3	0.00
Beryllium	0.95	0.00276	0.002622	0.000085	0.064	0.00000544	1	1.14	0.002304772	NS	N/A	NS	N/A
Cadmium	0.75	0.00276	0.00207	0.0003733	0.064	2.38933E-05	1	1.14	0.001836749	3.4	0.00	0.85	0.00
Cobalt	23.1	0.00276	0.063756	0.0011667	0.064	7.46667E-05	1	1.14	0.055991813	43.9	0.00	23.1	0.00
Copper	57.5	0.00276	0.1587	0.0031	0.064	0.0001984	1	1.14	0.139384561	33.2	0.00	26.9	0.01
Manganese	3090	0.00276	8.5284	0.2956667	0.064	0.018922667	1	1.14	7.497651462	9770	0.00	977	0.01
Nickel	37.1	0.00276	0.102396	0.0023	0.064	0.0001472	1	1.14	0.089950175	79	0.00	57.2	0.00
Selenium	0.6	0.00276	0.001656	0.00065	0.064	0.0000416	1	1.14	0.001489123	0.8	0.00	0.4	0.00
Silver	0.31	0.00276	0.0008556	0.0007667	0.064	4.90667E-05	1	1.14	0.000793567	39.7	0.00	3.97	0.00
Uranium	406	0.00276	1.12056	0.1333333	0.064	0.008533333	1	1.14	0.990432749	1,600	0.00	160	0.01
Vanadium	32.8	0.00276	0.090528	0.00025	0.064	0.000016	1	1.14	0.079424561	114	0.00	11.4	0.01
Zinc	142	0.00276	0.39192	0.0047	0.064	0.0003008	1	1.14	0.344053333	224	0.00	10.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 24. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.00496	0.008928	0.0029667	0.0131	3.88633E-05	1	0.1064	0.084275031	NS	N/A	NS	N/A
Arsenic	82.1	0.00496	0.407216	0.0012033	0.0131	1.57637E-05	1	0.1064	3.8273662	22.8	0.17	5.7	0.67
Barium	112	0.00496	0.55552	0.0669	0.0131	0.00087639	1	0.1064	5.22928938	416.5	0.01	208.3	0.03
Beryllium	0.95	0.00496	0.004712	0.000085	0.0131	1.1135E-06	1	0.1064	0.04429618	NS	N/A	NS	N/A
Cadmium	0.75	0.00496	0.00372	0.0003733	0.0131	4.89067E-06	1	0.1064	0.035008371	3.4	0.01	0.85	0.04
Cobalt	23.1	0.00496	0.114576	0.0011667	0.0131	1.52833E-05	1	0.1064	1.076985746	43.9	0.02	23.1	0.05
Copper	57.5	0.00496	0.2852	0.0031	0.0131	0.00004061	1	0.1064	2.680832801	33.2	0.08	26.9	0.10
Manganese	3090	0.00496	15.3264	0.2956667	0.0131	0.003873233	1	0.1064	144.0815154	9770	0.01	977	0.15
Nickel	37.1	0.00496	0.184016	0.0023	0.0131	0.00003013	1	0.1064	1.729756861	79	0.02	57.2	0.03
Selenium	0.6	0.00496	0.002976	0.00065	0.0131	0.000008515	1	0.1064	0.028049953	0.8	0.04	0.4	0.07
Silver	0.31	0.00496	0.0015376	0.0007667	0.0131	1.00433E-05	1	0.1064	0.01454552	39.7	0.00	3.97	0.00
Uranium	406	0.00496	2.01376	0.1333333	0.0131	0.001746667	1	0.1064	18.94273183	1,600	0.01	160	0.12
Vanadium	32.8	0.00496	0.162688	0.00025	0.0131	0.000003275	1	0.1064	1.529053336	114	0.01	11.4	0.13
Zinc	142	0.00496	0.70432	0.0047	0.0131	0.00006157	1	0.1064	6.620127538	224	0.03	10.5	0.63

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 18. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.00469	0.008442	0.0029667	0.537	0.0015931	1	6.55	0.001532076	0.62	0.00	0.062	0.02
Arsenic	82.1	0.00469	0.385049	0.0012033	0.537	0.00064619	1	6.55	0.058884762	9.63	0.01	1.91	0.03
Barium	112	0.00469	0.52528	0.0669	0.537	0.0359253	1	6.55	0.085680198	51	0.00	5.1	0.02
Beryllium	0.95	0.00469	0.0044555	0.000085	0.537	0.000045645	1	6.55	0.000687198	6.2	0.00	0.62	0.00
Cadmium	0.75	0.00469	0.0035175	0.0003733	0.537	0.00020048	1	6.55	0.000567631	2.3	0.00	0.23	0.00
Cobalt	23.1	0.00469	0.108339	0.0011667	0.537	0.0006265	1	6.55	0.016635954	20	0.00	5	0.00
Copper	57.5	0.00469	0.269675	0.0031	0.537	0.0016647	1	6.55	0.041425908	35.4	0.00	24.3	0.00
Manganese	3090	0.00469	14.4921	0.2956667	0.537	0.158773	1	6.55	2.236774504	268	0.01	83	0.03
Nickel	37.1	0.00469	0.173999	0.0023	0.537	0.0012351	1	6.55	0.026753298	42.1	0.00	23.1	0.00
Selenium	0.6	0.00469	0.002814	0.00065	0.537	0.00034905	1	6.55	0.000482908	0.25	0.00	0.025	0.02
Silver	0.31	0.00469	0.0014539	0.0007667	0.537	0.0004117	1	6.55	0.000284824	2.7	0.00	0.27	0.00
Uranium	406	0.00469	1.90414	0.1333333	0.537	0.0716	1	6.55	0.301639695	5	0.06	0.5	0.60
Vanadium	32.8	0.00469	0.153832	0.00025	0.537	0.00013425	1	6.55	0.023506298	2.1	0.01	0.21	0.11
Zinc	142	0.00469	0.66598	0.0047	0.537	0.0025239	1	6.55	0.102061664	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 16. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0004	0.00026	0.0025	0.127	0.0003175	1	0.955	0.000604712	0.62	0.001	0.062	0.010
Arsenic	15.55	0.0004	0.00622	0.009378	0.127	0.001190978	1	0.955	0.007760186	9.63	0.001	1.91	0.004
Barium	368.2	0.0004	0.14728	0.008828	0.127	0.001121128	1	0.955	0.155393851	51	0.003	5.1	0.030
Beryllium	15.7	0.0004	0.00628	0.038789	0.127	0.004926189	1	0.955	0.011734229	6.2	0.002	0.62	0.019
Cadmium	5.665	0.0004	0.002266	0.044516	0.127	0.005653505	1	0.955	0.008292676	2.3	0.004	0.23	0.036
Cobalt	86.95	0.0004	0.03478	1.196	0.127	0.151892	1	0.955	0.195468063	20	0.010	5	0.039
Copper	390	0.0004	0.156	0.275158	0.127	0.034945053	1	0.955	0.199942463	35.4	0.006	24.3	0.008
Manganese	2386	0.0004	0.9544	88.96316	0.127	11.29832105	1	0.955	12.8300744	268	0.048	83	0.155
Nickel	387.25	0.0004	0.1549	1.748	0.127	0.221996	1	0.955	0.394655497	42.1	0.009	23.1	0.017
Selenium	0.5	0.0004	0.0002	0.008144	0.127	0.001034344	1	0.955	0.001292507	0.25	0.005	0.025	0.052
Silver	0.26	0.0004	0.000104	0.005	0.127	0.000635	1	0.955	0.000773822	2.7	0.000	0.27	0.003
Uranium	2920.45	0.0004	1.16818	17.978	0.127	2.283206	1	0.955	3.614016754	5	0.723	0.5	**7.228**
Vanadium	8.55	0.0004	0.00342	0.0005	0.127	0.0000635	1	0.955	0.003647644	2.1	0.002	0.21	0.017
Zinc	528.55	0.0004	0.21142	3.774	0.127	0.479298	1	0.955	0.723264921	225	0.003	22.5	0.032

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 16. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00276	0.001794	0.0025	0.064	0.00016	1	1.14	0.001714035	NS	N/A	NS	N/A
Arsenic	15.55	0.00276	0.042918	0.0093778	0.064	0.000600178	1	1.14	0.03817384	22.8	0.00	5.7	0.01
Barium	368.2	0.00276	1.016232	0.0088278	0.064	0.000564978	1	1.14	0.891927173	416.5	0.00	208.3	0.00
Beryllium	15.7	0.00276	0.043332	0.0387889	0.064	0.002482489	1	1.14	0.040188148	NS	N/A	NS	N/A
Cadmium	5.665	0.00276	0.0156354	0.0445158	0.064	0.002849011	1	1.14	0.016214395	3.4	0.00	0.85	0.02
Cobalt	86.95	0.00276	0.239982	1.196	0.064	0.076544	1	1.14	0.277654386	43.9	0.01	23.1	0.01
Copper	390	0.00276	1.0764	0.2751579	0.064	0.017610105	1	1.14	0.959657987	33.2	0.03	26.9	0.04
Manganese	2386	0.00276	6.58536	88.963158	0.064	5.693642106	1	1.14	10.77105448	9770	0.00	977	0.01
Nickel	387.25	0.00276	1.06881	1.748	0.064	0.111872	1	1.14	1.035685965	79	0.01	57.2	0.02
Selenium	0.5	0.00276	0.00138	0.0081444	0.064	0.000521244	1	1.14	0.001667758	0.8	0.00	0.4	0.00
Silver	0.26	0.00276	0.0007176	0.005	0.064	0.00032	1	1.14	0.000910175	39.7	0.00	3.97	0.00
Uranium	2920.45	0.00276	8.060442	17.978	0.064	1.150592	1	1.14	8.079854386	1,600	0.01	160	0.05
Vanadium	8.55	0.00276	0.023598	0.0005	0.064	0.000032	1	1.14	0.02072807	114	0.00	11.4	0.00
Zinc	528.55	0.00276	1.458798	3.774	0.064	0.241536	1	1.14	1.491521053	224	0.01	10.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 22. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
Antimony	0.65	0.00496	0.003224	0.0025	0.0131	0.00003275	1	0.1064	0.030608553	NS	N/A	NS	N/A
Arsenic	15.55	0.00496	0.077128	0.009378	0.0131	0.000122849	1	0.1064	0.726041813	22.8	0.03	5.7	0.13
Barium	368.2	0.00496	1.826272	0.008828	0.0131	0.000115644	1	0.1064	17.1652974	416.5	0.04	208.3	0.08
Beryllium	15.7	0.00496	0.077872	0.038789	0.0131	0.000508134	1	0.1064	0.736655399	NS	N/A	NS	N/A
Cadmium	5.665	0.00496	0.0280984	0.044516	0.0131	0.000583157	1	0.1064	0.269563504	3.4	0.08	0.85	0.32
Cobalt	86.95	0.00496	0.431272	1.196	0.0131	0.0156676	1	0.1064	4.20056015	43.9	0.10	23.1	0.18
Copper	390	0.00496	1.9344	0.275158	0.0131	0.003604568	1	0.1064	18.21432865	33.2	0.55	26.9	0.68
Manganese	2386	0.00496	11.83456	88.96316	0.0131	1.165417368	1	0.1064	122.1802384	9770	0.01	977	0.13
Nickel	387.25	0.00496	1.92076	1.748	0.0131	0.0228988	1	0.1064	18.26746992	79	0.23	57.2	0.32
Selenium	0.5	0.00496	0.00248	0.008144	0.0131	0.000106692	1	0.1064	0.024311017	0.8	0.03	0.4	0.06
Silver	0.26	0.00496	0.0012896	0.005	0.0131	0.0000655	1	0.1064	0.012735902	39.7	0.00	3.97	0.00
Uranium	2920.45	0.00496	14.485432	17.978	0.0131	0.2355118	1	0.1064	138.354735	1,600	0.09	160	0.86
Vanadium	8.55	0.00496	0.042408	0.0005	0.0131	0.00000655	1	0.1064	0.398632989	114	0.00	11.4	0.03
Zinc	528.55	0.00496	2.621608	3.774	0.0131	0.0494394	1	0.1064	25.10382895	224	0.11	10.5	**2.39**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 16. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00469	0.0030485	0.0025	0.537	0.0013425	1	6.55	0.000670382	0.62	0.00	0.062	0.01
Arsenic	15.55	0.00469	0.0729295	0.009378	0.537	0.005035867	1	6.55	0.011903109	9.63	0.00	1.91	0.01
Barium	368.2	0.00469	1.726858	0.008828	0.537	0.004740517	1	6.55	0.264366186	51	0.01	5.1	0.05
Beryllium	15.7	0.00469	0.073633	0.038789	0.537	0.020829633	1	6.55	0.014421776	6.2	0.00	0.62	0.02
Cadmium	5.665	0.00469	0.02656885	0.044516	0.537	0.023904979	1	6.55	0.007705928	2.3	0.00	0.23	0.03
Cobalt	86.95	0.00469	0.4077955	1.196	0.537	0.642252	1	6.55	0.160312595	20	0.01	5	0.03
Copper	390	0.00469	1.8291	0.275158	0.537	0.147759789	1	6.55	0.301810655	35.4	0.01	24.3	0.01
Manganese	2386	0.00469	11.19034	88.96316	0.537	47.77321579	1	6.55	9.002069587	268	0.03	83	0.11
Nickel	387.25	0.00469	1.8162025	1.748	0.537	0.938676	1	6.55	0.420592137	42.1	0.01	23.1	0.02
Selenium	0.5	0.00469	0.002345	0.008144	0.537	0.004373567	1	6.55	0.001025735	0.25	0.00	0.025	0.04
Silver	0.26	0.00469	0.0012194	0.005	0.537	0.002685	1	6.55	0.000596092	2.7	0.00	0.27	0.00
Uranium	2920.45	0.00469	13.6969105	17.978	0.537	9.654186	1	6.55	3.565052901	5	0.71	0.5	**7.13**
Vanadium	8.55	0.00469	0.0400995	0.0005	0.537	0.0002685	1	6.55	0.006163053	2.1	0.00	0.21	0.03
Zinc	528.55	0.00469	2.4788995	3.774	0.537	2.026638	1	6.55	0.687868321	225	0.00	22.5	0.03

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level

TABLE PH 14. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.0004	0.0003	0.002375	0.127	0.000301625	1	0.955	0.000629974	0.62	0.001	0.062	0.010
Arsenic	28.75	0.0004	0.0115	0.011133	0.127	0.001413933	1	0.955	0.013522443	9.63	0.001	1.91	0.007
Barium	262.85	0.0004	0.10514	0.021192	0.127	0.002691342	1	0.955	0.1129124	51	0.002	5.1	0.022
Beryllium	6.5	0.0004	0.0026	0.034708	0.127	0.004407958	1	0.955	0.007338176	6.2	0.001	0.62	0.012
Cadmium	0.155	0.0004	0.000062	0.043423	0.127	0.005514731	1	0.955	0.005839509	2.3	0.003	0.23	0.025
Cobalt	48.5	0.0004	0.0194	1.004	0.127	0.127508	1	0.955	0.153830366	20	0.008	5	0.031
Copper	70	0.0004	0.028	0.312846	0.127	0.039731462	1	0.955	0.070922996	35.4	0.002	24.3	0.003
Manganese	1325	0.0004	0.53	88.253	0.127	11.208131	1	0.955	12.29123665	268	0.046	83	0.148
Nickel	71.1	0.0004	0.02844	1.553	0.127	0.197231	1	0.955	0.236304712	42.1	0.006	23.1	0.010
Selenium	0.6	0.0004	0.00024	0.014733	0.127	0.001871133	1	0.955	0.002210611	0.25	0.009	0.025	0.088
Silver	0.3	0.0004	0.00012	0.014625	0.127	0.001857375	1	0.955	0.00207055	2.7	0.001	0.27	0.008
Uranium	656	0.0004	0.2624	17.554	0.127	2.229358	1	0.955	2.609170681	5	0.522	0.5	**5.218**
Vanadium	30.55	0.0004	0.01222	0.0005	0.127	0.0000635	1	0.955	0.012795812	2.1	0.006	0.21	0.061
Zinc	292	0.0004	0.1168	3.539	0.127	0.449453	1	0.955	0.592935079	225	0.003	22.5	0.026

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 14. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.00276	0.00207	0.002375	0.064	0.000152	1	1.14	0.001949123	NS	N/A	NS	N/A
Arsenic	28.75	0.00276	0.07935	0.0111333	0.064	0.000712533	1	1.14	0.070230292	22.8	0.00	5.7	0.01
Barium	262.85	0.00276	0.725466	0.0211917	0.064	0.001356267	1	1.14	0.637563392	416.5	0.00	208.3	0.00
Beryllium	6.5	0.00276	0.01794	0.0347083	0.064	0.002221333	1	1.14	0.01768538	NS	N/A	NS	N/A
Cadmium	0.155	0.00276	0.0004278	0.0434231	0.064	0.002779077	1	1.14	0.00281305	3.4	0.00	0.85	0.00
Cobalt	48.5	0.00276	0.13386	1.004	0.064	0.064256	1	1.14	0.173785965	43.9	0.00	23.1	0.01
Copper	70	0.00276	0.1932	0.3128462	0.064	0.020022154	1	1.14	0.187036977	33.2	0.01	26.9	0.01
Manganese	1325	0.00276	3.657	88.253	0.064	5.648192	1	1.14	8.162449123	9770	0.00	977	0.01
Nickel	71.1	0.00276	0.196236	1.553	0.064	0.099392	1	1.14	0.259322807	79	0.00	57.2	0.00
Selenium	0.6	0.00276	0.001656	0.0147333	0.064	0.000942933	1	1.14	0.002279766	0.8	0.00	0.4	0.01
Silver	0.3	0.00276	0.000828	0.014625	0.064	0.000936	1	1.14	0.001547368	39.7	0.00	3.97	0.00
Uranium	656	0.00276	1.81056	17.554	0.064	1.123456	1	1.14	2.573698246	1,600	0.00	160	0.02
Vanadium	30.55	0.00276	0.084318	0.0005	0.064	0.000032	1	1.14	0.073963158	114	0.00	11.4	0.01
Zinc	292	0.00276	0.80592	3.539	0.064	0.226496	1	1.14	0.90562807	224	0.00	10.5	0.09

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 20. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.00496	0.00372	0.002375	0.0131	3.11125E-05	1	0.1064	0.035254817	NS	N/A	NS	N/A
Arsenic	28.75	0.00496	0.1426	0.011133	0.0131	0.000145847	1	0.1064	1.341596303	22.8	0.06	5.7	0.24
Barium	262.85	0.00496	1.303736	0.021192	0.0131	0.000277611	1	0.1064	12.25576702	416.5	0.03	208.3	0.06
Beryllium	6.5	0.00496	0.03224	0.034708	0.0131	0.000454679	1	0.1064	0.307280819	NS	N/A	NS	N/A
Cadmium	0.155	0.00496	0.0007688	0.043423	0.0131	0.000568842	1	0.1064	0.012571826	3.4	0.00	0.85	0.01
Cobalt	48.5	0.00496	0.24056	1.004	0.0131	0.0131524	1	0.1064	2.384515038	43.9	0.05	23.1	0.10
Copper	70	0.00496	0.3472	0.312846	0.0131	0.004098285	1	0.1064	3.301675607	33.2	0.10	26.9	0.12
Manganese	1325	0.00496	6.572	88.253	0.0131	1.1561143	1	0.1064	72.6326532	9770	0.01	977	0.07
Nickel	71.1	0.00496	0.352656	1.553	0.0131	0.0203443	1	0.1064	3.505641917	79	0.04	57.2	0.06
Selenium	0.6	0.00496	0.002976	0.014733	0.0131	0.000193007	1	0.1064	0.029783897	0.8	0.04	0.4	0.07
Silver	0.3	0.00496	0.001488	0.014625	0.0131	0.000191588	1	0.1064	0.015785597	39.7	0.00	3.97	0.00
Uranium	656	0.00496	3.25376	17.554	0.0131	0.2299574	1	0.1064	32.74170489	1,600	0.02	160	0.20
Vanadium	30.55	0.00496	0.151528	0.0005	0.0131	0.00000655	1	0.1064	1.424135338	114	0.01	11.4	0.12
Zinc	292	0.00496	1.44832	3.539	0.0131	0.0463609	1	0.1064	14.04775282	224	0.06	10.5	**1.34**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 14. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.00469	0.0035175	0.002375	0.537	0.001275375	1	6.55	0.000731737	0.62	0.00	0.062	0.01
Arsenic	28.75	0.00469	0.1348375	0.011133	0.537	0.0059786	1	6.55	0.021498641	9.63	0.00	1.91	0.01
Barium	262.85	0.00469	1.2327665	0.021192	0.537	0.011379925	1	6.55	0.189946019	51	0.00	5.1	0.04
Beryllium	6.5	0.00469	0.030485	0.034708	0.537	0.018638375	1	6.55	0.007499752	6.2	0.00	0.62	0.01
Cadmium	0.155	0.00469	0.00072695	0.043423	0.537	0.023318192	1	6.55	0.003671014	2.3	0.00	0.23	0.02
Cobalt	48.5	0.00469	0.227465	1.004	0.537	0.539148	1	6.55	0.117040153	20	0.01	5	0.02
Copper	70	0.00469	0.3283	0.312846	0.537	0.167998385	1	6.55	0.075770746	35.4	0.00	24.3	0.00
Manganese	1325	0.00469	6.21425	88.253	0.537	47.391861	1	6.55	8.184139084	268	0.03	83	0.10
Nickel	71.1	0.00469	0.333459	1.553	0.537	0.833961	1	6.55	0.178232061	42.1	0.00	23.1	0.01
Selenium	0.6	0.00469	0.002814	0.014733	0.537	0.0079118	1	6.55	0.001637527	0.25	0.01	0.025	0.07
Silver	0.3	0.00469	0.001407	0.014625	0.537	0.007853625	1	6.55	0.001413836	2.7	0.00	0.27	0.01
Uranium	656	0.00469	3.07664	17.554	0.537	9.426498	1	6.55	1.908876031	5	0.38	0.5	**3.82**
Vanadium	30.55	0.00469	0.1432795	0.0005	0.537	0.0002685	1	6.55	0.021874733	2.1	0.01	0.21	0.10
Zinc	292	0.00469	1.36948	3.539	0.537	1.900443	1	6.55	0.499224885	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 15. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.600	0.0004	0.00024	0.0025	0.127	0.0003175	1	0.955	0.00058377	0.62	0.001	0.062	0.009
Arsenic	16.733	0.0004	0.006693333	0.001	0.127	0.000127	1	0.955	0.00714171	9.63	0.001	1.91	0.004
Barium	72.467	0.0004	0.028986667	0.005982	0.127	0.000759691	1	0.955	0.031148018	51	0.001	5.1	0.006
Beryllium	2.233	0.0004	0.000893333	0.002105	0.127	0.000267277	1	0.955	0.001215299	6.2	0.000	0.62	0.002
Cadmium	0.115	0.0004	0.000046	0.0002	0.127	0.0000254	1	0.955	7.47644E-05	2.3	0.000	0.23	0.000
Cobalt	17.567	0.0004	0.007026667	0.001367	0.127	0.000173567	1	0.955	0.007539511	20	0.000	5	0.002
Copper	19.233	0.0004	0.007693333	0.007367	0.127	0.000935567	1	0.955	0.009035497	35.4	0.000	24.3	0.000
Manganese	1074.000	0.0004	0.4296	0.659833	0.127	0.083798833	1	0.955	0.537590401	268	0.002	83	0.006
Nickel	28.900	0.0004	0.01156	0.073409	0.127	0.009322955	1	0.955	0.021866968	42.1	0.001	23.1	0.001
Selenium	0.470	0.0004	0.000188	0.003	0.127	0.000381	1	0.955	0.000595812	0.25	0.002	0.025	0.024
Silver	0.235	0.0004	0.000094	0.01	0.127	0.00127	1	0.955	0.001428272	2.7	0.001	0.27	0.005
Uranium	420.667	0.0004	0.168266667	2.596	0.127	0.329692	1	0.955	0.521422688	5	0.104	0.5	**1.043**
Vanadium	29.333	0.0004	0.011733333	0.0005	0.127	0.0000635	1	0.955	0.012352705	2.1	0.006	0.21	0.059
Zinc	63.667	0.0004	0.025466667	0.0192	0.127	0.0024384	1	0.955	0.029219965	225	0.000	22.5	0.001

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 15. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.600	0.00276	0.001656	0.0025	0.064	0.00016	1	1.14	0.001592982	NS	N/A	NS	N/A
Arsenic	16.733	0.00276	0.046184	0.001	0.064	0.000064	1	1.14	0.040568421	22.8	0.00	5.7	0.01
Barium	72.467	0.00276	0.200008	0.0059818	0.064	0.000382836	1	1.14	0.175781435	416.5	0.00	208.3	0.00
Beryllium	2.233	0.00276	0.006164	0.0021045	0.064	0.000134691	1	1.14	0.005525167	NS	N/A	NS	N/A
Cadmium	0.115	0.00276	0.0003174	0.0002	0.064	0.0000128	1	1.14	0.000289649	3.4	0.00	0.85	0.00
Cobalt	17.567	0.00276	0.048484	0.0013667	0.064	8.74667E-05	1	1.14	0.04260655	43.9	0.00	23.1	0.00
Copper	19.233	0.00276	0.053084	0.0073667	0.064	0.000471467	1	1.14	0.04697848	33.2	0.00	26.9	0.00
Manganese	1,074.000	0.00276	2.96424	0.6598333	0.064	0.042229333	1	1.14	2.637253801	9770	0.00	977	0.00
Nickel	28.900	0.00276	0.079764	0.0734091	0.064	0.004698182	1	1.14	0.074089633	79	0.00	57.2	0.00
Selenium	0.470	0.00276	0.0012972	0.003	0.064	0.000192	1	1.14	0.001306316	0.8	0.00	0.4	0.00
Silver	0.235	0.00276	0.0006486	0.01	0.064	0.00064	1	1.14	0.001130351	39.7	0.00	3.97	0.00
Uranium	420.667	0.00276	1.16104	2.596	0.064	0.166144	1	1.14	1.164196491	1,600	0.00	160	0.01
Vanadium	29.333	0.00276	0.08096	0.0005	0.064	0.000032	1	1.14	0.071045614	114	0.00	11.4	0.01
Zinc	63.667	0.00276	0.17572	0.0192	0.064	0.0012288	1	1.14	0.155218246	224	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 21. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.600	0.00496	0.002976	0.0025	0.0131	0.00003275	1	0.1064	0.028277726	NS	N/A	NS	N/A
Arsenic	16.733	0.00496	0.082997333	0.001	0.0131	0.0000131	1	0.1064	0.780173246	22.8	0.03	5.7	0.14
Barium	72.467	0.00496	0.359434667	0.005982	0.0131	7.83618E-05	1	0.1064	3.378881847	416.5	0.01	208.3	0.02
Beryllium	2.233	0.00496	0.011077333	0.002105	0.0131	2.75695E-05	1	0.1064	0.104369388	NS	N/A	NS	N/A
Cadmium	0.115	0.00496	0.0005704	0.0002	0.0131	0.00000262	1	0.1064	0.005385526	3.4	0.00	0.85	0.01
Cobalt	17.567	0.00496	0.087130667	0.001367	0.0131	1.79033E-05	1	0.1064	0.819065508	43.9	0.02	23.1	0.04
Copper	19.233	0.00496	0.095397333	0.007367	0.0131	9.65033E-05	1	0.1064	0.897498465	33.2	0.03	26.9	0.03
Manganese	1,074.000	0.00496	5.32704	0.659833	0.0131	0.008643817	1	0.1064	50.14740429	9770	0.01	977	0.05
Nickel	28.900	0.00496	0.143344	0.073409	0.0131	0.000961659	1	0.1064	1.356256194	79	0.02	57.2	0.02
Selenium	0.470	0.00496	0.0023312	0.003	0.0131	0.0000393	1	0.1064	0.022279135	0.8	0.03	0.4	0.06
Silver	0.235	0.00496	0.0011656	0.01	0.0131	0.000131	1	0.1064	0.01218609	39.7	0.00	3.97	0.00
Uranium	420.667	0.00496	2.086506667	2.596	0.0131	0.0340076	1	0.1064	19.92964536	1,600	0.01	160	0.12
Vanadium	29.333	0.00496	0.145493333	0.0005	0.0131	0.00000655	1	0.1064	1.367480107	114	0.01	11.4	0.12
Zinc	63.667	0.00496	0.315786667	0.0192	0.0131	0.00025152	1	0.1064	2.970283709	224	0.01	10.5	0.28

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 15. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.600	0.00469	0.002814	0.0025	0.537	0.0013425	1	6.55	0.00063458	0.62	0.00	0.062	0.01
Arsenic	16.733	0.00469	0.078479333	0.001	0.537	0.000537	1	6.55	0.012063562	9.63	0.00	1.91	0.01
Barium	72.467	0.00469	0.339868667	0.005982	0.537	0.003212236	1	6.55	0.052378764	51	0.00	5.1	0.01
Beryllium	2.233	0.00469	0.010474333	0.002105	0.537	0.001130141	1	6.55	0.001771675	6.2	0.00	0.62	0.00
Cadmium	0.115	0.00469	0.00053935	0.0002	0.537	0.0001074	1	6.55	9.87405E-05	2.3	0.00	0.23	0.00
Cobalt	17.567	0.00469	0.082387667	0.001367	0.537	0.0007339	1	6.55	0.012690316	20	0.00	5	0.00
Copper	19.233	0.00469	0.090204333	0.007367	0.537	0.0039559	1	6.55	0.014375608	35.4	0.00	24.3	0.00
Manganese	1,074.000	0.00469	5.03706	0.659833	0.537	0.3543305	1	6.55	0.823113053	268	0.00	83	0.01
Nickel	28.900	0.00469	0.135541	0.073409	0.537	0.039420682	1	6.55	0.026711707	42.1	0.00	23.1	0.00
Selenium	0.470	0.00469	0.0022043	0.003	0.537	0.001611	1	6.55	0.000582489	0.25	0.00	0.025	0.02
Silver	0.235	0.00469	0.00110215	0.01	0.537	0.00537	1	6.55	0.000988115	2.7	0.00	0.27	0.00
Uranium	420.667	0.00469	1.972926667	2.596	0.537	1.394052	1	6.55	0.514042545	5	0.10	0.5	**1.03**
Vanadium	29.333	0.00469	0.137573333	0.0005	0.537	0.0002685	1	6.55	0.021044555	2.1	0.01	0.21	0.10
Zinc	63.667	0.00469	0.298596667	0.0192	0.537	0.0103104	1	6.55	0.047161384	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PH 23. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0004	0.00024	0.00255	0.127	0.00032385	1	0.955	0.000590419	0.62	0.001	0.062	0.010
Arsenic	3.07	0.0004	0.001228	0.001813	0.127	0.000230261	1	0.955	0.001526975	9.63	0.000	1.91	0.001
Barium	33.86	0.0004	0.013544	0.036546	0.127	0.004641362	1	0.955	0.019042263	51	0.000	5.1	0.004
Beryllium	0.32	0.0004	0.000128	0.00005	0.127	0.00000635	1	0.955	0.000140681	6.2	0.000	0.62	0.000
Cadmium	0.182	0.0004	0.0000728	0.0015	0.127	0.0001905	1	0.955	0.000275707	2.3	0.000	0.23	0.001
Cobalt	2.914	0.0004	0.0011656	0.00025	0.127	0.00003175	1	0.955	0.00125377	20	0.000	5	0.000
Copper	2.29	0.0004	0.000916	0.003889	0.127	0.000493939	1	0.955	0.001476376	35.4	0.000	24.3	0.000
Manganese	874.6	0.0004	0.34984	0.012193	0.127	0.001548493	1	0.955	0.367946066	268	0.001	83	0.004
Nickel	4.29	0.0004	0.001716	0.004144	0.127	0.000526268	1	0.955	0.002347925	42.1	0.000	23.1	0.000
Selenium	2	0.0004	0.0008	0.002	0.127	0.000254	1	0.955	0.001103665	0.25	0.004	0.025	0.044
Silver	0.025	0.0004	0.00001	0.00035	0.127	0.00004445	1	0.955	5.70157E-05	2.7	0.000	0.27	0.000
Uranium	10.52375	0.0004	0.0042095	0.012962	0.127	0.001646115	1	0.955	0.006131534	5	0.001	0.5	0.012
Vanadium	9.2	0.0004	0.00368	0.002683	0.127	0.000340783	1	0.955	0.004210244	2.1	0.002	0.21	0.020
Zinc	18.87	0.0004	0.007548	0.009143	0.127	0.001161143	1	0.955	0.009119521	225	0.000	22.5	0.000

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 23. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00276	0.001656	0.00255	0.064	0.0001632	1	1.14	0.001595789	NS	N/A	NS	N/A
Arsenic	3.07	0.00276	0.0084732	0.0018131	0.064	0.000116037	1	1.14	0.007534418	22.8	0.00	5.7	0.00
Barium	33.86	0.00276	0.0934536	0.0365462	0.064	0.002338954	1	1.14	0.084028556	416.5	0.00	208.3	0.00
Beryllium	0.32	0.00276	0.0008832	0.00005	0.064	0.0000032	1	1.14	0.000777544	NS	N/A	NS	N/A
Cadmium	0.182	0.00276	0.00050232	0.0015	0.064	0.000096	1	1.14	0.000524842	3.4	0.00	0.85	0.00
Cobalt	2.914	0.00276	0.00804264	0.00025	0.064	0.000016	1	1.14	0.007068982	43.9	0.00	23.1	0.00
Copper	2.29	0.00276	0.0063204	0.0038893	0.064	0.000248914	1	1.14	0.005762556	33.2	0.00	26.9	0.00
Manganese	874.6	0.00276	2.413896	0.0121929	0.064	0.000780343	1	1.14	2.118137143	9770	0.00	977	0.00
Nickel	4.29	0.00276	0.0118404	0.0041438	0.064	0.000265206	1	1.14	0.010618953	79	0.00	57.2	0.00
Selenium	2	0.00276	0.00552	0.002	0.064	0.000128	1	1.14	0.004954386	0.8	0.01	0.4	0.01
Silver	0.025	0.00276	0.000069	0.00035	0.064	0.0000224	1	1.14	8.01754E-05	39.7	0.00	3.97	0.00
Uranium	10.52375	0.00276	0.02904555	0.0129615	0.064	0.000829538	1	1.14	0.026206218	1,600	0.00	160	0.00
Vanadium	9.2	0.00276	0.025392	0.0026833	0.064	0.000171733	1	1.14	0.022424327	114	0.00	11.4	0.00
Zinc	18.87	0.00276	0.0520812	0.0091429	0.064	0.000585143	1	1.14	0.046198546	224	0.00	10.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 29. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00496	0.002976	0.00255	0.0131	0.000033405	1	0.1064	0.028283882	NS	N/A	NS	N/A
Arsenic	3.07	0.00496	0.0152272	0.001813	0.0131	2.37513E-05	1	0.1064	0.143336009	22.8	0.01	5.7	0.03
Barium	33.86	0.00496	0.1679456	0.036546	0.0131	0.000478755	1	0.1064	1.582935664	416.5	0.00	208.3	0.01
Beryllium	0.32	0.00496	0.0015872	0.00005	0.0131	0.000000655	1	0.1064	0.014923449	NS	N/A	NS	N/A
Cadmium	0.182	0.00496	0.00090272	0.0015	0.0131	0.00001965	1	0.1064	0.008668891	3.4	0.00	0.85	0.01
Cobalt	2.914	0.00496	0.01445344	0.00025	0.0131	0.000003275	1	0.1064	0.135871382	43.9	0.00	23.1	0.01
Copper	2.29	0.00496	0.0113584	0.003889	0.0131	5.09496E-05	1	0.1064	0.10723073	33.2	0.00	26.9	0.00
Manganese	874.6	0.00496	4.338016	0.012193	0.0131	0.000159726	1	0.1064	40.77232826	9770	0.00	977	0.04
Nickel	4.29	0.00496	0.0212784	0.004144	0.0131	5.42844E-05	1	0.1064	0.200495154	79	0.00	57.2	0.00
Selenium	2	0.00496	0.00992	0.002	0.0131	0.0000262	1	0.1064	0.093479323	0.8	0.12	0.4	0.23
Silver	0.025	0.00496	0.000124	0.00035	0.0131	0.000004585	1	0.1064	0.001208506	39.7	0.00	3.97	0.00
Uranium	10.52375	0.00496	0.0521978	0.012962	0.0131	0.000169796	1	0.1064	0.492176656	1,600	0.00	160	0.00
Vanadium	9.2	0.00496	0.045632	0.002683	0.0131	3.51517E-05	1	0.1064	0.429202553	114	0.00	11.4	0.04
Zinc	18.87	0.00496	0.0935952	0.009143	0.0131	0.000119771	1	0.1064	0.880779807	224	0.00	10.5	0.08

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 23. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00469	0.002814	0.00255	0.537	0.00136935	1	6.55	0.000638679	0.62	0.00	0.062	0.01
Arsenic	3.07	0.00469	0.0143983	0.001813	0.537	0.000973622	1	6.55	0.002346858	9.63	0.00	1.91	0.00
Barium	33.86	0.00469	0.1588034	0.036546	0.537	0.019625285	1	6.55	0.027241021	51	0.00	5.1	0.01
Beryllium	0.32	0.00469	0.0015008	0.00005	0.537	0.00002685	1	6.55	0.000233229	6.2	0.00	0.62	0.00
Cadmium	0.182	0.00469	0.00085358	0.0015	0.537	0.0008055	1	6.55	0.000253295	2.3	0.00	0.23	0.00
Cobalt	2.914	0.00469	0.01366666	0.00025	0.537	0.00013425	1	6.55	0.002107009	20	0.00	5	0.00
Copper	2.29	0.00469	0.0107401	0.003889	0.537	0.002088546	1	6.55	0.001958572	35.4	0.00	24.3	0.00
Manganese	874.6	0.00469	4.101874	0.012193	0.537	0.006547564	1	6.55	0.627239933	268	0.00	83	0.01
Nickel	4.29	0.00469	0.0201201	0.004144	0.537	0.002225245	1	6.55	0.003411503	42.1	0.00	23.1	0.00
Selenium	2	0.00469	0.00938	0.002	0.537	0.001074	1	6.55	0.001596031	0.25	0.01	0.025	0.06
Silver	0.025	0.00469	0.00011725	0.00035	0.537	0.00018795	1	6.55	4.65954E-05	2.7	0.00	0.27	0.00
Uranium	10.52375	0.00469	0.049356388	0.012962	0.537	0.006960346	1	6.55	0.008597975	5	0.00	0.5	0.02
Vanadium	9.2	0.00469	0.043148	0.002683	0.537	0.00144095	1	6.55	0.006807473	2.1	0.00	0.21	0.03
Zinc	18.87	0.00469	0.0885003	0.009143	0.537	0.004909714	1	6.55	0.014261071	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 19. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00369	0.002214	0.00255	0.116	0.0002958	1	1.191	0.002107305	0.62	0.00	0.062	0.03
Arsenic	3.07	0.00369	0.0113283	0.001813	0.116	0.000210317	1	1.191	0.009688175	9.63	0.00	1.91	0.01
Barium	33.86	0.00369	0.1249434	0.036546	0.116	0.004239354	1	1.191	0.108465788	51	0.00	5.1	0.02
Beryllium	0.32	0.00369	0.0011808	0.00005	0.116	0.0000058	1	1.191	0.000996306	6.2	0.00	0.62	0.00
Cadmium	0.182	0.00369	0.00067158	0.0015	0.116	0.000174	1	1.191	0.000709975	2.3	0.00	0.23	0.00
Cobalt	2.914	0.00369	0.01075266	0.00025	0.116	0.000029	1	1.191	0.009052611	20	0.00	5	0.00
Copper	2.29	0.00369	0.0084501	0.003889	0.116	0.000451157	1	1.191	0.007473768	35.4	0.00	24.3	0.00
Manganese	874.6	0.00369	3.227274	0.012193	0.116	0.001414371	1	1.191	2.710905434	268	0.01	83	0.03
Nickel	4.29	0.00369	0.0158301	0.004144	0.116	0.000480686	1	1.191	0.013695035	42.1	0.00	23.1	0.00
Selenium	2	0.00369	0.00738	0.002	0.116	0.000232	1	1.191	0.006391268	0.25	0.03	0.025	0.26
Silver	0.025	0.00369	0.00009225	0.00035	0.116	0.0000406	1	1.191	0.000111545	2.7	0.00	0.27	0.00
Uranium	10.52375	0.00369	0.038832638	0.012962	0.116	0.001503538	1	1.191	0.033867486	5	0.01	0.5	0.07
Vanadium	9.2	0.00369	0.033948	0.002683	0.116	0.000311267	1	1.191	0.028765127	2.1	0.01	0.21	0.14
Zinc	18.87	0.00369	0.0696303	0.009143	0.116	0.001060571	1	1.191	0.059354216	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 21. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0004	0.00026	0.001881	0.127	0.000238919	1	0.955	0.000522428	0.62	0.001	0.062	0.008
Arsenic	6.34	0.0004	0.002537143	0.0025	0.127	0.0003175	1	0.955	0.002989155	9.63	0.000	1.91	0.002
Barium	81.00	0.0004	0.0324	0.0549	0.127	0.0069723	1	0.955	0.041227539	51	0.001	5.1	0.008
Beryllium	0.72	0.0004	0.000286	0.00005	0.127	0.00000635	1	0.955	0.000306126	6.2	0.000	0.62	0.000
Cadmium	0.39	0.0004	0.000156	0.00088	0.127	0.000111794	1	0.955	0.000280413	2.3	0.000	0.23	0.001
Cobalt	11.56	0.0004	0.004625714	0.000766	0.127	9.72344E-05	1	0.955	0.004945496	20	0.000	5	0.001
Copper	12.73	0.0004	0.005091429	0.0044	0.127	0.0005588	1	0.955	0.00591647	35.4	0.000	24.3	0.000
Manganese	1,127.43	0.0004	0.450971428	0.0944	0.127	0.0119888	1	0.955	0.484775108	268	0.002	83	0.006
Nickel	16.90	0.0004	0.00676	0.0259	0.127	0.003289336	1	0.955	0.010522865	42.1	0.000	23.1	0.000
Selenium	0.50	0.0004	0.0002	0.0005	0.127	0.0000635	1	0.955	0.000275916	0.25	0.001	0.025	0.011
Silver	0.23	0.0004	9.11429E-05	0.01	0.127	0.00127	1	0.955	0.00142528	2.7	0.001	0.27	0.005
Uranium	29.53	0.0004	0.0118112	0.0505	0.127	0.0064135	1	0.955	0.019083455	5	0.004	0.5	0.038
Vanadium	23.23	0.0004	0.009293333	0.001365	0.127	0.000173315	1	0.955	0.009912721	2.1	0.005	0.21	0.047
Zinc	52.26	0.0004	0.020902857	0.029735	0.127	0.003776362	1	0.955	0.025842114	225	0.000	22.5	0.001

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 21. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00276	0.001794	0.0018813	0.064	0.0001204	1	1.14	0.001679298	NS	N/A	NS	N/A
Arsenic	6.34	0.00276	0.017506286	0.0025	0.064	0.00016	1	1.14	0.015496742	22.8	0.00	5.7	0.00
Barium	81.00	0.00276	0.22356	0.0549	0.064	0.0035136	1	1.14	0.199187368	416.5	0.00	208.3	0.00
Beryllium	0.72	0.00276	0.0019734	0.00005	0.064	0.0000032	1	1.14	0.00173386	NS	N/A	NS	N/A
Cadmium	0.39	0.00276	0.0010764	0.0008803	0.064	5.63373E-05	1	1.14	0.000993629	3.4	0.00	0.85	0.00
Cobalt	11.56	0.00276	0.031917429	0.0007656	0.064	0.000049	1	1.14	0.028040727	43.9	0.00	23.1	0.00
Copper	12.73	0.00276	0.035130857	0.0044	0.064	0.0002816	1	1.14	0.031063559	33.2	0.00	26.9	0.00
Manganese	1,127.43	0.00276	3.111702856	0.0944	0.064	0.0060416	1	1.14	2.734863558	9770	0.00	977	0.00
Nickel	16.90	0.00276	0.046644	0.0259003	0.064	0.001657618	1	1.14	0.042369841	79	0.00	57.2	0.00
Selenium	0.50	0.00276	0.00138	0.0005	0.064	0.000032	1	1.14	0.001238596	0.8	0.00	0.4	0.00
Silver	0.23	0.00276	0.000628886	0.01	0.064	0.00064	1	1.14	0.001113058	39.7	0.00	3.97	0.00
Uranium	29.53	0.00276	0.08149728	0.0505	0.064	0.003232	1	1.14	0.07432393	1,600	0.00	160	0.00
Vanadium	23.23	0.00276	0.064124	0.0013647	0.064	0.00008734	1	1.14	0.056325737	114	0.00	11.4	0.00
Zinc	52.26	0.00276	0.144229714	0.0297351	0.064	0.001903049	1	1.14	0.128186634	224	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 27. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00496	0.003224	0.001881	0.0131	2.46444E-05	1	0.1064	0.030532372	NS	N/A	NS	N/A
Arsenic	6.34	0.00496	0.031460571	0.0025	0.0131	0.00003275	1	0.1064	0.295989863	22.8	0.01	5.7	0.05
Barium	81.00	0.00496	0.40176	0.0549	0.0131	0.00071919	1	0.1064	3.782699154	416.5	0.01	208.3	0.02
Beryllium	0.72	0.00496	0.0035464	0.00005	0.0131	0.000000655	1	0.1064	0.033336983	NS	N/A	NS	N/A
Cadmium	0.39	0.00496	0.0019344	0.00088	0.0131	1.15315E-05	1	0.1064	0.01828883	3.4	0.01	0.85	0.02
Cobalt	11.56	0.00496	0.057358857	0.000766	0.0131	1.00297E-05	1	0.1064	0.539181267	43.9	0.01	23.1	0.02
Copper	12.73	0.00496	0.063133714	0.0044	0.0131	0.00005764	1	0.1064	0.593903706	33.2	0.02	26.9	0.02
Manganese	1,127.43	0.00496	5.592045712	0.0944	0.0131	0.00123664	1	0.1064	52.56844316	9770	0.01	977	0.05
Nickel	16.90	0.00496	0.083824	0.0259	0.0131	0.000339294	1	0.1064	0.7910084	79	0.01	57.2	0.01
Selenium	0.50	0.00496	0.00248	0.0005	0.0131	0.00000655	1	0.1064	0.023369831	0.8	0.03	0.4	0.06
Silver	0.23	0.00496	0.001130171	0.01	0.0131	0.000131	1	0.1064	0.011853115	39.7	0.00	3.97	0.00
Uranium	29.53	0.00496	0.14645888	0.0505	0.0131	0.00066155	1	0.1064	1.382710808	1,600	0.00	160	0.01
Vanadium	23.23	0.00496	0.115237333	0.001365	0.0131	1.78774E-05	1	0.1064	1.083225665	114	0.01	11.4	0.10
Zinc	52.26	0.00496	0.259195429	0.029735	0.0131	0.00038953	1	0.1064	2.43970826	224	0.01	10.5	0.23

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 21. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00469	0.0030485	0.001881	0.537	0.001010231	1	6.55	0.000619654	0.62	0.00	0.062	0.01
Arsenic	6.34	0.00469	0.029748	0.0025	0.537	0.0013425	1	6.55	0.004746641	9.63	0.00	1.91	0.00
Barium	81.00	0.00469	0.37989	0.0549	0.537	0.0294813	1	6.55	0.062499435	51	0.00	5.1	0.01
Beryllium	0.72	0.00469	0.00335335	0.00005	0.537	0.00002685	1	6.55	0.000516061	6.2	0.00	0.62	0.00
Cadmium	0.39	0.00469	0.0018291	0.00088	0.537	0.000472705	1	6.55	0.000351421	2.3	0.00	0.23	0.00
Cobalt	11.56	0.00469	0.0542365	0.000766	0.537	0.000411141	1	6.55	0.008343151	20	0.00	5	0.00
Copper	12.73	0.00469	0.059697	0.0044	0.537	0.0023628	1	6.55	0.009474779	35.4	0.00	24.3	0.00
Manganese	1,127.43	0.00469	5.287639998	0.0944	0.537	0.0506928	1	6.55	0.815012641	268	0.00	83	0.01
Nickel	16.90	0.00469	0.079261	0.0259	0.537	0.013908453	1	6.55	0.014224344	42.1	0.00	23.1	0.00
Selenium	0.50	0.00469	0.002345	0.0005	0.537	0.0002685	1	6.55	0.000399008	0.25	0.00	0.025	0.02
Silver	0.23	0.00469	0.00106865	0.01	0.537	0.00537	1	6.55	0.000983	2.7	0.00	0.27	0.00
Uranium	29.53	0.00469	0.13848632	0.0505	0.537	0.0271185	1	6.55	0.025283179	5	0.01	0.5	0.05
Vanadium	23.23	0.00469	0.108964333	0.001365	0.537	0.000732837	1	6.55	0.01674766	2.1	0.01	0.21	0.08
Zinc	52.26	0.00469	0.245086	0.029735	0.537	0.015967768	1	6.55	0.039855537	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 17. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.00369	0.0023985	0.001881	0.116	0.000218225	1	1.191	0.002197082	0.62	0.00	0.062	0.04
Arsenic	6.34	0.00369	0.023405143	0.0025	0.116	0.00029	1	1.191	0.019895166	9.63	0.00	1.91	0.01
Barium	81.00	0.00369	0.29889	0.0549	0.116	0.0063684	1	1.191	0.256304282	51	0.01	5.1	0.05
Beryllium	0.72	0.00369	0.00263835	0.00005	0.116	0.0000058	1	1.191	0.002220109	6.2	0.00	0.62	0.00
Cadmium	0.39	0.00369	0.0014391	0.00088	0.116	0.000102111	1	1.191	0.001294048	2.3	0.00	0.23	0.01
Cobalt	11.56	0.00369	0.042672214	0.000766	0.116	8.88125E-05	1	1.191	0.035903465	20	0.00	5	0.01
Copper	12.73	0.00369	0.046968429	0.0044	0.116	0.0005104	1	1.191	0.039864676	35.4	0.00	24.3	0.00
Manganese	1,127.43	0.00369	4.160211427	0.0944	0.116	0.0109504	1	1.191	3.502234951	268	0.01	83	0.04
Nickel	16.90	0.00369	0.062361	0.0259	0.116	0.003004433	1	1.191	0.054882815	42.1	0.00	23.1	0.00
Selenium	0.50	0.00369	0.001845	0.0005	0.116	0.000058	1	1.191	0.001597817	0.25	0.01	0.025	0.06
Silver	0.23	0.00369	0.000840793	0.01	0.116	0.00116	1	1.191	0.001679927	2.7	0.00	0.27	0.01
Uranium	29.53	0.00369	0.10895832	0.0505	0.116	0.005858	1	1.191	0.096403291	5	0.02	0.5	0.19
Vanadium	23.23	0.00369	0.085731	0.001365	0.116	0.000158304	1	1.191	0.072115284	2.1	0.03	0.21	0.34
Zinc	52.26	0.00369	0.192828857	0.029735	0.116	0.003449276	1	1.191	0.164801119	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 19. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.0004	0.0002	0.0005	0.127	0.0000635	1	0.955	0.000275916	0.62	0.000	0.062	0.004
Arsenic	3.63	0.0004	0.001453333	0.004353	0.127	0.000552768	1	0.955	0.002100629	9.63	0.000	1.91	0.001
Barium	55.88	0.0004	0.022351111	0.026656	0.127	0.003385344	1	0.955	0.026949167	51	0.001	5.1	0.005
Beryllium	1.79	0.0004	0.000716444	0.002906	0.127	0.000369094	1	0.955	0.001136689	6.2	0.000	0.62	0.002
Cadmium	0.55	0.0004	0.000219556	0.002929	0.127	0.000372035	1	0.955	0.000619467	2.3	0.000	0.23	0.003
Cobalt	8.02	0.0004	0.003207556	0.0044	0.127	0.0005588	1	0.955	0.003943828	20	0.000	5	0.001
Copper	14.36	0.0004	0.005742222	0.047162	0.127	0.005989619	1	0.955	0.01228465	35.4	0.000	24.3	0.001
Manganese	1,147.22	0.0004	0.458888889	8.719	0.127	1.107313	1	0.955	1.640001978	268	0.006	83	0.020
Nickel	16.71	0.0004	0.006684444	0.242769	0.127	0.030831631	1	0.955	0.039283849	42.1	0.001	23.1	0.002
Selenium	2.59	0.0004	0.001037333	0.001	0.127	0.000127	1	0.955	0.001219197	0.25	0.005	0.025	0.049
Silver	0.15	0.0004	5.91111E-05	0.005	0.127	0.000635	1	0.955	0.000726818	2.7	0.000	0.27	0.003
Uranium	139.80	0.0004	0.05592	0.1	0.127	0.0127	1	0.955	0.071853403	5	0.014	0.5	0.144
Vanadium	10.33	0.0004	0.004133333	0.00025	0.127	0.00003175	1	0.955	0.004361344	2.1	0.002	0.21	0.021
Zinc	53.83	0.0004	0.021533333	0.298059	0.127	0.037853471	1	0.955	0.062185135	225	0.000	22.5	0.003

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PK 19. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00276	0.00138	0.0005	0.064	0.000032	1	1.14	0.001238596	NS	N/A	NS	N/A
Arsenic	3.63	0.00276	0.010028	0.0043525	0.064	0.00027856	1	1.14	0.009040842	22.8	0.00	5.7	0.00
Barium	55.88	0.00276	0.154222667	0.0266563	0.064	0.001706	1	1.14	0.136779532	416.5	0.00	208.3	0.00
Beryllium	1.79	0.00276	0.004943467	0.0029063	0.064	0.000186	1	1.14	0.004499532	NS	N/A	NS	N/A
Cadmium	0.55	0.00276	0.001514933	0.0029294	0.064	0.000187482	1	1.14	0.001493347	3.4	0.00	0.85	0.00
Cobalt	8.02	0.00276	0.022132133	0.0044	0.064	0.0002816	1	1.14	0.01966117	43.9	0.00	23.1	0.00
Copper	14.36	0.00276	0.039621333	0.0471624	0.064	0.003018391	1	1.14	0.037403267	33.2	0.00	26.9	0.00
Manganese	1,147.22	0.00276	3.166333333	8.719	0.064	0.558016	1	1.14	3.266973099	9770	0.00	977	0.00
Nickel	16.71	0.00276	0.046122667	0.2427688	0.064	0.0155372	1	1.14	0.054087602	79	0.00	57.2	0.00
Selenium	2.59	0.00276	0.0071576	0.001	0.064	0.000064	1	1.14	0.006334737	0.8	0.01	0.4	0.02
Silver	0.15	0.00276	0.000407867	0.005	0.064	0.00032	1	1.14	0.00063848	39.7	0.00	3.97	0.00
Uranium	139.80	0.00276	0.385848	0.1	0.064	0.0064	1	1.14	0.344077193	1,600	0.00	160	0.00
Vanadium	10.33	0.00276	0.02852	0.00025	0.064	0.000016	1	1.14	0.025031579	114	0.00	11.4	0.00
Zinc	53.83	0.00276	0.14858	0.2980588	0.064	0.019075765	1	1.14	0.14706646	224	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PN 25. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00496	0.00248	0.0005	0.0131	0.00000655	1	0.1064	0.023369831	NS	N/A	NS	N/A
Arsenic	3.63	0.00496	0.018021333	0.004353	0.0131	5.70178E-05	1	0.1064	0.169909315	22.8	0.01	5.7	0.03
Barium	55.88	0.00496	0.277153778	0.026656	0.0131	0.000349197	1	0.1064	2.608110664	416.5	0.01	208.3	0.01
Beryllium	1.79	0.00496	0.008883911	0.002906	0.0131	3.80719E-05	1	0.1064	0.083853224	NS	N/A	NS	N/A
Cadmium	0.55	0.00496	0.002722489	0.002929	0.0131	3.83753E-05	1	0.1064	0.025947972	3.4	0.01	0.85	0.03
Cobalt	8.02	0.00496	0.039773689	0.0044	0.0131	0.00005764	1	0.1064	0.374354595	43.9	0.01	23.1	0.02
Copper	14.36	0.00496	0.071203556	0.047162	0.0131	0.000617827	1	0.1064	0.675012992	33.2	0.02	26.9	0.03
Manganese	1,147.22	0.00496	5.690222221	8.719	0.0131	0.1142189	1	0.1064	54.55301806	9770	0.01	977	0.06
Nickel	16.71	0.00496	0.082887111	0.242769	0.0131	0.003180271	1	0.1064	0.808903964	79	0.01	57.2	0.01
Selenium	2.59	0.00496	0.012862933	0.001	0.0131	0.0000131	1	0.1064	0.121015351	0.8	0.15	0.4	0.30
Silver	0.15	0.00496	0.000732978	0.005	0.0131	0.0000655	1	0.1064	0.00750449	39.7	0.00	3.97	0.00
Uranium	139.80	0.00496	0.693408	0.1	0.0131	0.00131	1	0.1064	6.529304511	1,600	0.00	160	0.04
Vanadium	10.33	0.00496	0.051253333	0.00025	0.0131	0.000003275	1	0.1064	0.481735041	114	0.00	11.4	0.04
Zinc	53.83	0.00496	0.267013333	0.298059	0.0131	0.003904571	1	0.1064	2.546220901	224	0.01	10.5	0.24

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PG 19. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00469			0.537		1	6.55					
COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00469	0.002345	0.0005	0.537	0.0002685	1	6.55	0.000399008	0.62	0.00	0.062	0.01
Arsenic	3.63	0.00469	0.017040333	0.004353	0.537	0.002337293	1	6.55	0.002958416	9.63	0.00	1.91	0.00
Barium	55.88	0.00469	0.262066778	0.026656	0.537	0.014314406	1	6.55	0.042195601	51	0.00	5.1	0.01
Beryllium	1.79	0.00469	0.008400311	0.002906	0.537	0.001560656	1	6.55	0.001520758	6.2	0.00	0.62	0.00
Cadmium	0.55	0.00469	0.002574289	0.002929	0.537	0.001573094	1	6.55	0.000633188	2.3	0.00	0.23	0.00
Cobalt	8.02	0.00469	0.037608589	0.0044	0.537	0.0023628	1	6.55	0.006102502	20	0.00	5	0.00
Copper	14.36	0.00469	0.067327556	0.047162	0.537	0.025326184	1	6.55	0.014145609	35.4	0.00	24.3	0.00
Manganese	1,147.22	0.00469	5.380472221	8.719	0.537	4.682103	1	6.55	1.536271026	268	0.01	83	0.02
Nickel	16.71	0.00469	0.078375111	0.242769	0.537	0.130366819	1	6.55	0.031868997	42.1	0.00	23.1	0.00
Selenium	2.59	0.00469	0.012162733	0.001	0.537	0.000537	1	6.55	0.001938891	0.25	0.01	0.025	0.08
Silver	0.15	0.00469	0.000693078	0.005	0.537	0.002685	1	6.55	0.000515737	2.7	0.00	0.27	0.00
Uranium	139.80	0.00469	0.655662	0.1	0.537	0.0537	1	6.55	0.108299542	5	0.02	0.5	0.22
Vanadium	10.33	0.00469	0.048463333	0.00025	0.537	0.00013425	1	6.55	0.007419478	2.1	0.00	0.21	0.04
Zinc	53.83	0.00469	0.252478333	0.298059	0.537	0.160057588	1	6.55	0.062982583	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level

TABLE PC 15. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00369	0.001845	0.0005	0.116	0.000058	1	1.191	0.001597817	0.62	0.00	0.062	0.03
Arsenic	3.63	0.00369	0.013407	0.004353	0.116	0.00050489	1	1.191	0.011680848	9.63	0.00	1.91	0.01
Barium	55.88	0.00369	0.206189	0.026656	0.116	0.003092125	1	1.191	0.175718829	51	0.00	5.1	0.03
Beryllium	1.79	0.00369	0.0066092	0.002906	0.116	0.000337125	1	1.191	0.005832347	6.2	0.00	0.62	0.01
Cadmium	0.55	0.00369	0.0020254	0.002929	0.116	0.000339812	1	1.191	0.001985904	2.3	0.00	0.23	0.01
Cobalt	8.02	0.00369	0.0295897	0.0044	0.116	0.0005104	1	1.191	0.025272964	20	0.00	5	0.01
Copper	14.36	0.00369	0.052972	0.047162	0.116	0.005470833	1	1.191	0.049070389	35.4	0.00	24.3	0.00
Manganese	1,147.22	0.00369	4.233249999	8.719	0.116	1.011404	1	1.191	4.403571788	268	0.02	83	0.05
Nickel	16.71	0.00369	0.061664	0.242769	0.116	0.028161175	1	1.191	0.075419962	42.1	0.00	23.1	0.00
Selenium	2.59	0.00369	0.0095694	0.001	0.116	0.000116	1	1.191	0.008132158	0.25	0.03	0.025	0.33
Silver	0.15	0.00369	0.0005453	0.005	0.116	0.00058	1	1.191	0.000944836	2.7	0.00	0.27	0.00
Uranium	139.80	0.00369	0.515862	0.1	0.116	0.0116	1	1.191	0.442873216	5	0.09	0.5	0.89
Vanadium	10.33	0.00369	0.03813	0.00025	0.116	0.000029	1	1.191	0.032039463	2.1	0.02	0.21	0.15
Zinc	53.83	0.00369	0.198645	0.298059	0.116	0.034574824	1	1.191	0.195818492	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight

TABLE PH 43. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	1.15	0.0004	0.00046	0.0025	0.127	0.0003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	62.05	0.0004	0.02482	0.004829	0.127	0.000613229	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	116	0.0004	0.0464	0.008914	0.127	0.001132114	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	1.045	0.0004	0.000418	0.016586	0.127	0.002106386	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.14	0.0004	0.000056	0.005943	0.127	0.000754743	73	0.433828571	100	0.2376	0.10307767	1	0.955	0.108783677	2.3	0.047	0.23	0.473
Cobalt	8.6	0.0004	0.00344	0.753	0.127	0.095631	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	75.95	0.0004	0.03038	0.742714	0.127	0.094324714	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	331	0.0004	0.1324	24.21	0.127	3.07467	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	24.3	0.0004	0.00972	0.777143	0.127	0.098697143	61	47.40571428	100	0.2376	11.2635977	1	0.955	11.90786896	42.1	0.283	23.1	0.515
Selenium	0.55	0.0004	0.00022	0.007514	0.127	0.000954314	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.275	0.0004	0.00011	0.001	0.127	0.000127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	75.75	0.0004	0.0303	5.199	0.127	0.660273	50	259.95	100	0.2376	61.76412	1	0.955	65.39758429	5	**13.080**	0.5	**130.795**
Vanadium	58.85	0.0004	0.02354	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	73.3	0.0004	0.02932	0.734286	0.127	0.093254286	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 30. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.15	0.000506	0.0005819	0.0025	0.109	0.0002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	62.05	0.000506	0.0313973	0.004829	0.109	0.000526314	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	116	0.000506	0.058696	0.008914	0.109	0.000971657	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	1.045	0.000506	0.00052877	0.016586	0.109	0.001807843	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.14	0.000506	0.00007084	0.005943	0.109	0.000647771	73	0.433828571	100	0.300494	0.13036288	1	2.52	0.052016466	3.4	0.0153	0.85	0.061
Cobalt	8.6	0.000506	0.0043516	0.753	0.109	0.082077	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	75.95	0.000506	0.0384307	0.742714	0.109	0.080955857	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	331	0.000506	0.167486	24.21	0.109	2.63889	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	24.3	0.000506	0.0122958	0.777143	0.109	0.084708571	61	47.40571428	100	0.300494	14.2451327	1	2.52	5.691324238	79	0.0720	57.2	0.099
Selenium	0.55	0.000506	0.0002783	0.007514	0.109	0.000819057	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.275	0.000506	0.00013915	0.001	0.109	0.000109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	75.75	0.000506	0.0383295	5.199	0.109	0.566691	50	259.95	100	0.300494	78.1134153	1	2.52	31.23747452	1,600	0.0195	160	0.195
Vanadium	58.85	0.000506	0.0297781	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	73.3	0.000506	0.0370898	0.734286	0.109	0.080037143	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 30. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.15	0.000869	0.00099935	0.0025	0.166	0.000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	62.05	0.000869	0.05392145	0.0048286	0.166	0.000801543	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	116	0.000869	0.100804	0.0089143	0.166	0.001479771	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	1.045	0.000869	0.000908105	0.0165857	0.166	0.002753229	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.14	0.000869	0.00012166	0.0059429	0.166	0.000986514	73	0.433828571	100	0.516131	0.223912374	1	4.7	0.04787671	3.4	0.014	0.85	0.056
Cobalt	8.6	0.000869	0.0074734	0.753	0.166	0.124998	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	75.95	0.000869	0.06600055	0.7427143	0.166	0.123290571	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	331	0.000869	0.287639	24.21	0.166	4.01886	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	24.3	0.000869	0.0211167	0.7771429	0.166	0.129005714	61	47.40571428	100	0.516131	24.46755872	1	4.7	5.2378045	79	0.066	57.2	0.092
Selenium	0.55	0.000869	0.00047795	0.0075143	0.166	0.001247371	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.275	0.000869	0.000238975	0.001	0.166	0.000166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	75.75	0.000869	0.06582675	5.199	0.166	0.863034	50	259.95	100	0.516131	134.1682535	1	4.7	28.7440669	1,600	0.018	160	0.180
Vanadium	58.85	0.000869	0.05114065	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	73.3	0.000869	0.0636977	0.7342857	0.166	0.121891429	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 46. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.55	0.0004	0.00022	0.00025	0.127	0.00003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	9.85	0.0004	0.00394	0.002742	0.127	0.000348218	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	87.05	0.0004	0.03482	0.012594	0.127	0.001599406	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	3.1	0.0004	0.00124	0.00225	0.127	0.00028575	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	2.2	0.0004	0.00088	0.039712	0.127	0.005043394	73	2.898958824	100	0.2376	0.68879262	1	0.955	0.72745132	2.3	0.316	0.23	**3.163**
Cobalt	59.75	0.0004	0.0239	0.051567	0.127	0.006548967	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	27.5	0.0004	0.011	0.050829	0.127	0.006455335	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	2965	0.0004	1.186	71.524	0.127	9.083548	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	155.75	0.0004	0.0623	1.103	0.127	0.140081	61	67.283	100	0.2376	15.9864408	1	0.955	16.95164586	42.1	0.403	23.1	0.734
Selenium	2.815	0.0004	0.001126	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.215	0.0004	0.000086	0.004684	0.127	0.000594916	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	1892	0.0004	0.7568	0.366	0.127	0.046482	50	18.3	100	0.2376	4.34808	1	0.955	5.394096335	5	**1.079**	0.5	**10.788**
Vanadium	14.1525	0.0004	0.005661	0.002003	0.127	0.000254423	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	357.5	0.0004	0.143	1.16	0.127	0.14732	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 33. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.000506	0.0002783	0.00025	0.109	0.00002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	9.85	0.000506	0.0049841	0.002742	0.109	0.000298864	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	87.05	0.000506	0.0440473	0.012594	0.109	0.001372719	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	3.1	0.000506	0.0015686	0.00225	0.109	0.00024525	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	2.2	0.000506	0.0011132	0.039712	0.109	0.004328582	73	2.898958824	100	0.300494	0.87111973	1	2.52	0.347841871	3.4	0.1023	0.85	0.409
Cobalt	59.75	0.000506	0.0302335	0.051567	0.109	0.005620767	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	27.5	0.000506	0.013915	0.050829	0.109	0.005540406	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	2965	0.000506	1.50029	71.524	0.109	7.796116	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	155.75	0.000506	0.0788095	1.103	0.109	0.120227	61	67.283	100	0.300494	20.2181378	1	2.52	8.102053294	79	0.1026	57.2	0.142
Selenium	2.815	0.000506	0.00142439	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.215	0.000506	0.00010879	0.004684	0.109	0.000510597	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	1892	0.000506	0.957352	0.366	0.109	0.039894	50	18.3	100	0.300494	5.4990402	1	2.52	2.577891349	1,600	0.0016	160	0.016
Vanadium	14.1525	0.000506	0.007161165	0.002003	0.109	0.000218363	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	357.5	0.000506	0.180895	1.16	0.109	0.12644	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 33. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.000869	0.00047795	0.00025	0.166	0.0000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	9.85	0.000869	0.00855965	0.0027419	0.166	0.000455151	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	87.05	0.000869	0.07564645	0.0125938	0.166	0.002090563	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	3.1	0.000869	0.0026939	0.00225	0.166	0.0003735	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	2.2	0.000869	0.0019118	0.0397118	0.166	0.006592153	73	2.898958824	100	0.516131	1.496242517	1	4.7	0.32015882	3.4	0.094	0.85	0.377
Cobalt	59.75	0.000869	0.05192275	0.0515667	0.166	0.008560067	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	27.5	0.000869	0.0238975	0.0508294	0.166	0.008437682	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	2965	0.000869	2.576585	71.524	0.166	11.872984	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	155.75	0.000869	0.13534675	1.103	0.166	0.183098	61	67.283	100	0.516131	34.72684207	1	4.7	7.456444	79	0.094	57.2	0.130
Selenium	2.815	0.000869	0.002446235	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.215	0.000869	0.000186835	0.0046844	0.166	0.000777606	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	1892	0.000869	1.644148	0.366	0.166	0.060756	50	18.3	100	0.516131	9.4451973	1	4.7	2.37236198	1,600	0.001	160	0.015
Vanadium	14.1525	0.000869	0.012298523	0.0020033	0.166	0.000332553	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	357.5	0.000869	0.3106675	1.16	0.166	0.19256	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 36. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00276	0.001518	0.00025	0.064	0.000016	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	9.85	0.00276	0.027186	0.0027419	0.064	0.00017548	0.25	21	5	79	0.06444	0.2579211	1	1.14	0.25024788	22.8	0.01	5.7	0.04
Barium	87.05	0.00276	0.240258	0.0125938	0.064	0.000806	2.2	21	74	79	0.06444	3.79693368	1	1.14	3.54210323	416.5	0.01	208.3	0.02
Beryllium	3.1	0.00276	0.008556	0.00225	0.064	0.000144	0.41	21	12.7	79	0.06444	0.652074804	1	1.14	0.57962702	NS	N/A	NS	N/A
Cadmium	2.2	0.00276	0.006072	0.0397118	0.064	0.002541553	2	21	1.5	79	0.06444	0.1034262	1	1.14	0.09828049	3.4	0.03	0.85	0.12
Cobalt	59.75	0.00276	0.16491	0.0515667	0.064	0.003300267	0.46	21	27.8	79	0.06444	1.421456184	1	1.14	1.39444425	43.9	0.03	23.1	0.06
Copper	27.5	0.00276	0.0759	0.0508294	0.064	0.003253082	37.2	21	73	79	0.06444	4.21966008	1	1.14	3.77088874	33.2	0.11	26.9	0.14
Manganese	2965	0.00276	8.1834	71.524	0.064	4.577536	688	21	17200	79	0.06444	884.9210112	1	1.14	787.440305	9770	0.08	977	0.81
Nickel	155.75	0.00276	0.42987	1.103	0.064	0.070592	5	21	71	79	0.06444	3.6821016	1	1.14	3.66891544	79	0.05	57.2	0.06
Selenium	2.815	0.00276	0.0077694	0.0005	0.064	0.000032	0.6	21	0.3	79	0.06444	0.02339172	1	1.14	0.02736239	0.8	0.03	0.4	0.07
Silver	0.215	0.00276	0.0005934	0.0046844	0.064	0.0002998	0.88	21	3.6	79	0.06444	0.195175872	1	1.14	0.17199041	39.7	0.00	3.97	0.04
Uranium	1892	0.00276	5.22192	0.366	0.064	0.023424	35.9	21	1177.05	79	0.06444	60.40651974	1	1.14	57.5893542	1,600	0.04	160	0.36
Vanadium	14.1525	0.00276	0.0390609	0.0020033	0.064	0.000128213	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	357.5	0.00276	0.9867	1.16	0.064	0.07424	183	21	115	79	0.06444	8.3308032	1	1.14	8.23837123	224	0.04	10.5	0.78

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PG 36. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.55	0.00469	0.0025795	0.00025	0.537	0.00013425	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	9.85	0.00469	0.0461965	0.002742	0.537	0.001472387	3	61	0.25	39	0.13331	0.25695503	1	6.55	0.046507467	9.63	0.00	1.91	0.02
Barium	87.05	0.00469	0.4082645	0.012594	0.537	0.006762844	75	61	2.2	39	0.13331	6.21331248	1	6.55	1.011960278	51	0.02	5.1	0.20
Beryllium	3.1	0.00469	0.014539	0.00225	0.537	0.00120825	3	61	0.41	39	0.13331	0.26527357	1	6.55	0.042903942	6.2	0.01	0.62	0.07
Cadmium	2.2	0.00469	0.010318	0.039712	0.537	0.021325218	3.8	61	2	39	0.13331	0.41299438	1	6.55	0.067883603	2.3	0.03	0.23	0.30
Cobalt	59.75	0.00469	0.2802275	0.051567	0.537	0.0276913	10.3	61	0.46	39	0.13331	0.86150254	1	6.55	0.17853761	20	0.01	5	0.04
Copper	27.5	0.00469	0.128975	0.050829	0.537	0.027295394	30	61	37.2	39	0.13331	4.37363448	1	6.55	0.69158853	35.4	0.02	24.3	0.03
Manganese	2965	0.00469	13.90585	71.524	0.537	38.408388	17200	61	688	39	0.13331	1434.45826	1	6.55	226.9881675	268	0.85	83	**2.73**
Nickel	155.75	0.00469	0.7304675	1.103	0.537	0.592311	66	61	5	39	0.13331	5.6270151	1	6.55	1.061037191	42.1	0.03	23.1	0.05
Selenium	2.815	0.00469	0.01320235	0.0005	0.537	0.0002685	0.3	61	0.6	39	0.13331	0.05559027	1	6.55	0.010543682	0.25	0.04	0.025	0.42
Silver	0.215	0.00469	0.00100835	0.004684	0.537	0.002515509	0.1	61	0.88	39	0.13331	0.0538839	1	6.55	0.008764544	2.7	0.00	0.27	0.03
Uranium	1892	0.00469	8.87348	0.366	0.537	0.196542	1177.05	61	35.9	39	0.13331	97.5829858	1	6.55	16.28290195	5	**3.26**	0.5	**32.57**
Vanadium	14.1525	0.00469	0.066375225	0.002003	0.537	0.00107579	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	357.5	0.00469	1.676675	1.16	0.537	0.62292	115	61	183	39	0.13331	18.8660312	1	6.55	3.231393313	225	0.01	22.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 38. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.55	0.00369	0.0020295	0.00025	0.116	0.000029	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	9.85	0.00369	0.0363465	0.002742	0.116	0.000318058	3	100	0.36531	1.09593	1	1.191	0.950961005	9.63	0.10	1.91	0.50
Barium	87.05	0.00369	0.3212145	0.012594	0.116	0.001460875	75	100	0.36531	27.39825	1	1.191	23.27533617	51	0.46	5.1	**4.56**
Beryllium	3.1	0.00369	0.011439	0.00225	0.116	0.000261	3	100	0.36531	1.09593	1	1.191	0.93	6.2	0.15	0.62	**1.50**
Cadmium	2.2	0.00369	0.008118	0.039712	0.116	0.004606565	3.8	100	0.36531	1.388178	1	1.191	1.176240608	2.3	0.51	0.23	**5.11**
Cobalt	59.75	0.00369	0.2204775	0.051567	0.116	0.005981733	10.3	100	0.36531	3.762693	1	1.191	3.349414134	20	0.17	5	0.67
Copper	27.5	0.00369	0.101475	0.050829	0.116	0.005896212	30	100	0.36531	10.9593	1	1.191	9.291915375	35.4	0.26	24.3	0.38
Manganese	2965	0.00369	10.94085	71.524	0.116	8.296784	17200	100	0.36531	6283.332	1	1.191	5291.830087	268	**19.75**	83	**63.76**
Nickel	155.75	0.00369	0.5747175	1.103	0.116	0.127948	66	100	0.36531	24.11046	1	1.191	20.83385852	42.1	0.49	23.1	0.90
Selenium	2.815	0.00369	0.01038735	0.0005	0.116	0.000058	0.3	100	0.36531	0.109593	1	1.191	0.100787867	0.25	0.40	0.025	**4.03**
Silver	0.215	0.00369	0.00079335	0.004684	0.116	0.000543388	0.1	100	0.36531	0.036531	1	1.191	0.03179491	2.7	0.01	0.27	0.12
Uranium	1892	0.00369	6.98148	0.366	0.116	0.042456	1177.05	100	0.36531	429.98753	1	1.191	366.9281853	5	**73.39**	0.5	**733.86**
Vanadium	14.1525	0.00369	0.052222725	0.002003	0.116	0.000232387	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	357.5	0.00369	1.319175	1.16	0.116	0.13456	115	100	0.36531	42.01065	1	1.191	36.49402603	225	0.16	22.5	**1.62**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 52. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.0004	0.00024	0.0025	0.127	0.0003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	12.8	0.0004	0.00512	0.003	0.127	0.000381	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	79.9	0.0004	0.03196	0.0206	0.127	0.0026162	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	0.37	0.0004	0.000148	0.00065	0.127	0.00008255	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.12	0.0004	0.000048	0.0005	0.127	0.0000635	73	0.0365	100	0.2376	0.0086724	1	0.955	0.009197801	2.3	0.004	0.23	0.040
Cobalt	6.9	0.0004	0.00276	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	11.3	0.0004	0.00452	0.0086	0.127	0.0010922	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	274	0.0004	0.1096	0.0183	0.127	0.0023241	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	11.5	0.0004	0.0046	0.0005	0.127	0.0000635	61	0.0305	100	0.2376	0.0072468	1	0.955	0.012471518	42.1	0.000	23.1	0.001
Selenium	0.475	0.0004	0.00019	0.002	0.127	0.000254	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.24	0.0004	0.000096	0.001	0.127	0.000127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	2.6	0.0004	0.00104	0.0005	0.127	0.0000635	50	0.025	100	0.2376	0.00594	1	0.955	0.007375393	5	0.001	0.5	0.015
Vanadium	25.1	0.0004	0.01004	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	154	0.0004	0.0616	0.058	0.127	0.007366	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 39. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000506	0.0003036	0.0025	0.109	0.0002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	12.8	0.000506	0.0064768	0.003	0.109	0.000327	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	79.9	0.000506	0.0404294	0.0206	0.109	0.0022454	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	0.37	0.000506	0.00018722	0.00065	0.109	0.00007085	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.12	0.000506	0.00006072	0.0005	0.109	0.0000545	73	0.0365	100	0.300494	0.01096803	1	2.52	0.004398115	3.4	0.0013	0.85	0.005
Cobalt	6.9	0.000506	0.0034914	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	11.3	0.000506	0.0057178	0.0086	0.109	0.0009374	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	274	0.000506	0.138644	0.0183	0.109	0.0019947	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	11.5	0.000506	0.005819	0.0005	0.109	0.0000545	61	0.0305	100	0.300494	0.00916507	1	2.52	0.005967685	79	0.0001	57.2	0.000
Selenium	0.475	0.000506	0.00024035	0.002	0.109	0.000218	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.24	0.000506	0.00012144	0.001	0.109	0.000109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	2.6	0.000506	0.0013156	0.0005	0.109	0.0000545	50	0.025	100	0.300494	0.00751235	1	2.52	0.003524782	1,600	0.0000	160	0.000
Vanadium	25.1	0.000506	0.0127006	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	154	0.000506	0.077924	0.058	0.109	0.006322	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 39. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
Antimony	0.6	0.000869	0.0005214	0.0025	0.166	0.000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	12.8	0.000869	0.0111232	0.003	0.166	0.000498	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	79.9	0.000869	0.0694331	0.0206	0.166	0.0034196	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	0.37	0.000869	0.00032153	0.00065	0.166	0.0001079	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.12	0.000869	0.00010428	0.0005	0.166	0.000083	73	0.0365	100	0.516131	0.018838782	1	4.7	0.0040481	3.4	0.001	0.85	0.005
Cobalt	6.9	0.000869	0.0059961	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	11.3	0.000869	0.0098197	0.0086	0.166	0.0014276	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	274	0.000869	0.238106	0.0183	0.166	0.0030378	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	11.5	0.000869	0.0099935	0.0005	0.166	0.000083	61	0.0305	100	0.516131	0.015741996	1	4.7	0.0054933	79	0.000	57.2	0.000
Selenium	0.475	0.000869	0.000412775	0.002	0.166	0.000332	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.24	0.000869	0.00020856	0.001	0.166	0.000166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	2.6	0.000869	0.0022594	0.0005	0.166	0.000083	50	0.025	100	0.516131	0.012903275	1	4.7	0.00324376	1,600	0.000	160	0.000
Vanadium	25.1	0.000869	0.0218119	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	154	0.000869	0.133826	0.058	0.166	0.009628	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 42. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00276	0.001656	0.0025	0.064	0.00016	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	12.8	0.00276	0.035328	0.003	0.064	0.000192	2	21	8	79	0.06444	0.4343256	1	1.14	0.41214526	22.8	0.02	5.7	0.07
Barium	79.9	0.00276	0.220524	0.0206	0.064	0.0013184	38.5	21	250	79	0.06444	13.2478974	1	1.14	11.8155612	416.5	0.03	208.3	0.06
Beryllium	0.37	0.00276	0.0010212	0.00065	0.064	0.0000416	0.85	21	4.8	79	0.06444	0.25585902	1	1.14	0.22537002	NS	N/A	NS	N/A
Cadmium	0.12	0.00276	0.0003312	0.0005	0.064	0.000032	2.3	21	12.9	79	0.06444	0.68783256	1	1.14	0.60368049	3.4	0.18	0.85	0.71
Cobalt	6.9	0.00276	0.019044	0.0005	0.064	0.000032	2.3	21	11.3	79	0.06444	0.6063804	1	1.14	0.54864596	43.9	0.01	23.1	0.02
Copper	11.3	0.00276	0.031188	0.0086	0.064	0.0005504	20	21	36	79	0.06444	2.1033216	1	1.14	1.87285965	33.2	0.06	26.9	0.07
Manganese	274	0.00276	0.75624	0.0183	0.064	0.0011712	4120	21	38800	79	0.06444	2030.968368	1	1.14	1782.2156	9770	0.18	977	**1.82**
Nickel	11.5	0.00276	0.03174	0.0005	0.064	0.000032	19	21	140	79	0.06444	7.3841796	1	1.14	6.5052207	79	0.08	57.2	0.11
Selenium	0.475	0.00276	0.001311	0.002	0.064	0.000128	0.4	21	0.5	79	0.06444	0.03086676	1	1.14	0.02833839	0.8	0.04	0.4	0.07
Silver	0.24	0.00276	0.0006624	0.001	0.064	0.000064	0.25	21	0.5	79	0.06444	0.0288369	1	1.14	0.02593272	39.7	0.00	3.97	0.01
Uranium	2.6	0.00276	0.007176	0.0005	0.064	0.000032	30.8	21	108.66	79	0.06444	5.948274889	1	1.14	5.2241078	1,600	0.00	160	0.03
Vanadium	25.1	0.00276	0.069276	0.0005	0.064	0.000032	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	154	0.00276	0.42504	0.058	0.064	0.003712	170	21	340	79	0.06444	19.609092	1	1.14	17.5770561	224	0.08	10.5	**1.67**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PG 42. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.6	0.00469	0.002814	0.0025	0.537	0.0013425	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	12.8	0.00469	0.060032	0.003	0.537	0.001611	8	61	2	39	0.13331	0.7545346	1	6.55	0.124607267	9.63	0.01	1.91	0.07
Barium	79.9	0.00469	0.374731	0.0206	0.537	0.0110622	250	61	38.5	39	0.13331	22.3314247	1	6.55	3.468277534	51	0.07	5.1	0.68
Beryllium	0.37	0.00469	0.0017353	0.00065	0.537	0.00034905	4.8	61	0.85	39	0.13331	0.43452395	1	6.55	0.066657755	6.2	0.01	0.62	0.11
Cadmium	0.12	0.00469	0.0005628	0.0005	0.537	0.0002685	12.9	61	2.3	39	0.13331	1.16859546	1	6.55	0.178538437	2.3	0.08	0.23	0.78
Cobalt	6.9	0.00469	0.032361	0.0005	0.537	0.0002685	11.3	61	2.3	39	0.13331	1.0384849	1	6.55	0.163528916	20	0.01	5	0.03
Copper	11.3	0.00469	0.052997	0.0086	0.537	0.0046182	36	61	20	39	0.13331	3.9673056	1	6.55	0.614491725	35.4	0.02	24.3	0.03
Manganese	274	0.00469	1.28506	0.0183	0.537	0.0098271	38800	61	4120	39	0.13331	3369.38359	1	6.55	514.6074008	268	**1.92**	83	**6.20**
Nickel	11.5	0.00469	0.053935	0.0005	0.537	0.0002685	140	61	19	39	0.13331	12.3725011	1	6.55	1.897206809	42.1	0.05	23.1	0.08
Selenium	0.475	0.00469	0.00222775	0.002	0.537	0.001074	0.5	61	0.4	39	0.13331	0.06145591	1	6.55	0.009886666	0.25	0.04	0.025	0.40
Silver	0.24	0.00469	0.0011256	0.001	0.537	0.000537	0.5	61	0.25	39	0.13331	0.05365728	1	6.55	0.008445782	2.7	0.00	0.27	0.03
Uranium	2.6	0.00469	0.012194	0.0005	0.537	0.0002685	108.66	61	30.8	39	0.13331	10.4372249	1	6.55	1.595372129	5	0.32	0.5	**3.19**
Vanadium	25.1	0.00469	0.117719	0.0005	0.537	0.0002685	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	154	0.00469	0.72226	0.058	0.537	0.031146	340	61	170	39	0.13331	36.486947	1	6.55	5.685550076	225	0.03	22.5	0.25

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 44. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.00369	0.002214	0.0025	0.116	0.00029	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	12.8	0.00369	0.047232	0.003	0.116	0.000348	8	100	0.36531	2.92248	1	1.191	2.493753149	9.63	0.26	1.91	**1.31**
Barium	79.9	0.00369	0.294831	0.0206	0.116	0.0023896	250	100	0.36531	91.3275	1	1.191	76.9309157	51	**1.51**	5.1	**15.08**
Beryllium	0.37	0.00369	0.0013653	0.00065	0.116	0.0000754	4.8	100	0.36531	1.753488	1	1.191	1.473491772	6.2	0.24	0.62	**2.38**
Cadmium	0.12	0.00369	0.0004428	0.0005	0.116	0.000058	12.9	100	0.36531	4.712499	1	1.191	3.957178673	2.3	**1.72**	0.23	**17.21**
Cobalt	6.9	0.00369	0.025461	0.0005	0.116	0.000058	11.3	100	0.36531	4.128003	1	1.191	3.487424013	20	0.17	5	0.70
Copper	11.3	0.00369	0.041697	0.0086	0.116	0.0009976	36	100	0.36531	13.15116	1	1.191	11.07796356	35.4	0.31	24.3	0.46
Manganese	274	0.00369	1.01106	0.0183	0.116	0.0021228	38800	100	0.36531	14174.028	1	1.191	11901.7978	268	**44.41**	83	**143.40**
Nickel	11.5	0.00369	0.042435	0.0005	0.116	0.000058	140	100	0.36531	51.1434	1	1.191	42.97724013	42.1	**1.02**	23.1	**1.86**
Selenium	0.475	0.00369	0.00175275	0.002	0.116	0.000232	0.5	100	0.36531	0.182655	1	1.191	0.155029177	0.25	0.62	0.025	**6.20**
Silver	0.24	0.00369	0.0008856	0.001	0.116	0.000116	0.5	100	0.36531	0.182655	1	1.191	0.154203694	2.7	0.06	0.27	0.57
Uranium	2.6	0.00369	0.009594	0.0005	0.116	0.000058	108.66	100	0.36531	39.69356	1	1.191	33.33602984	5	**6.67**	0.5	**66.67**
Vanadium	25.1	0.00369	0.092619	0.0005	0.116	0.000058	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	154	0.00369	0.56826	0.058	0.116	0.006728	340	100	0.36531	124.2054	1	1.191	104.7694274	225	0.47	22.5	**4.66**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 51. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.65	0.0004	0.00026	0.002817	0.127	0.000357717	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	9.2	0.0004	0.00368	0.002128	0.127	0.000270228	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	79.925	0.0004	0.03197	0.041011	0.127	0.005208411	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	0.755	0.0004	0.000302	0.00005	0.127	0.00000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.35375	0.0004	0.0001415	0.00085	0.127	0.00010795	73	0.06205	100	0.2376	0.01474308	1	0.955	0.015698984	2.3	0.007	0.23	0.068
Cobalt	8.375	0.0004	0.00335	0.000662	0.127	8.41022E-05	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	12.05	0.0004	0.00482	0.005144	0.127	0.000653344	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	1328	0.0004	0.5312	0.062622	0.127	0.007953022	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	22.8	0.0004	0.00912	0.003728	0.127	0.000473428	61	0.227394444	100	0.2376	0.05402892	1	0.955	0.066620259	42.1	0.002	23.1	0.003
Selenium	0.55	0.0004	0.00022	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.265	0.0004	0.000106	0.00035	0.127	0.00004445	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	15.945	0.0004	0.006378	0.015325	0.127	0.001946275	50	0.76625	100	0.2376	0.182061	1	0.955	0.199356309	5	0.040	0.5	0.399
Vanadium	19.7	0.0004	0.00788	0.002061	0.127	0.000261761	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	68.5	0.0004	0.0274	0.022944	0.127	0.002913944	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 38. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000506	0.0003289	0.002817	0.109	0.000307017	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	9.2	0.000506	0.0046552	0.002128	0.109	0.000231928	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	79.925	0.000506	0.04044205	0.041011	0.109	0.004470211	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	0.755	0.000506	0.00038203	0.00005	0.109	0.00000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.35375	0.000506	0.000178998	0.00085	0.109	0.00009265	73	0.06205	100	0.300494	0.01864565	1	2.52	0.007506865	3.4	0.0022	0.85	0.009
Cobalt	8.375	0.000506	0.00423775	0.000662	0.109	7.21822E-05	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	12.05	0.000506	0.0060973	0.005144	0.109	0.000560744	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	1328	0.000506	0.671968	0.062622	0.109	0.006825822	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	22.8	0.000506	0.0115368	0.003728	0.109	0.000406328	61	0.227394444	100	0.300494	0.06833067	1	2.52	0.03185468	79	0.0004	57.2	0.001
Selenium	0.55	0.000506	0.0002783	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.265	0.000506	0.00013409	0.00035	0.109	0.00003815	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	15.945	0.000506	0.00806817	0.015325	0.109	0.001670425	50	0.76625	100	0.300494	0.23025353	1	2.52	0.095234969	1,600	0.0001	160	0.001
Vanadium	19.7	0.000506	0.0099682	0.002061	0.109	0.000224661	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	68.5	0.000506	0.034661	0.022944	0.109	0.002500944	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 38. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000869	0.00056485	0.0028167	0.166	0.000467567	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	9.2	0.000869	0.0079948	0.0021278	0.166	0.000353211	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	79.925	0.000869	0.069454825	0.0410111	0.166	0.006807844	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	0.755	0.000869	0.000656095	0.00005	0.166	0.0000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.35375	0.000869	0.000307409	0.00085	0.166	0.0001411	73	0.06205	100	0.516131	0.032025929	1	4.7	0.00690945	3.4	0.002	0.85	0.008
Cobalt	8.375	0.000869	0.007277875	0.0006622	0.166	0.000109929	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	12.05	0.000869	0.01047145	0.0051444	0.166	0.000853978	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	1328	0.000869	1.154032	0.0626222	0.166	0.010395289	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	22.8	0.000869	0.0198132	0.0037278	0.166	0.000618811	61	0.227394444	100	0.516131	0.117365322	1	4.7	0.02931858	79	0.000	57.2	0.001
Selenium	0.55	0.000869	0.00047795	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.265	0.000869	0.000230285	0.00035	0.166	0.0000581	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	15.945	0.000869	0.013856205	0.015325	0.166	0.00254395	50	0.76625	100	0.516131	0.395485379	1	4.7	0.08763522	1,600	0.000	160	0.001
Vanadium	19.7	0.000869	0.0171193	0.0020611	0.166	0.000342144	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	68.5	0.000869	0.0595265	0.0229444	0.166	0.003808778	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 41. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
Antimony	0.65	0.00276	0.001794	0.0028167	0.064	0.000180267	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	9.2	0.00276	0.025392	0.0021278	0.064	0.000136178	2	21	8	79	0.06444	0.4343256	1	1.14	0.40338051	22.8	0.02	5.7	0.07
Barium	79.925	0.00276	0.220593	0.0410111	0.064	0.002624711	38.5	21	250	79	0.06444	13.2478974	1	1.14	11.8167676	416.5	0.03	208.3	0.06
Beryllium	0.755	0.00276	0.0020838	0.00005	0.064	0.0000032	0.85	21	4.8	79	0.06444	0.25585902	1	1.14	0.22626844	NS	N/A	NS	N/A
Cadmium	0.35375	0.00276	0.00097635	0.00085	0.064	0.0000544	2.3	21	12.9	79	0.06444	0.68783256	1	1.14	0.60426606	3.4	0.18	0.85	0.71
Cobalt	8.375	0.00276	0.023115	0.0006622	0.064	4.23822E-05	2.3	21	11.3	79	0.06444	0.6063804	1	1.14	0.55222612	43.9	0.01	23.1	0.02
Copper	12.05	0.00276	0.033258	0.0051444	0.064	0.000329244	20	21	36	79	0.06444	2.1033216	1	1.14	1.87448144	33.2	0.06	26.9	0.07
Manganese	1328	0.00276	3.66528	0.0626222	0.064	0.004007822	4120	21	38800	79	0.06444	2030.968368	1	1.14	1784.76987	9770	0.18	977	**1.83**
Nickel	22.8	0.00276	0.062928	0.0037278	0.064	0.000238578	19	21	140	79	0.06444	7.3841796	1	1.14	6.53275981	79	0.08	57.2	0.11
Selenium	0.55	0.00276	0.001518	0.0005	0.064	0.000032	0.4	21	0.5	79	0.06444	0.03086676	1	1.14	0.02843575	0.8	0.04	0.4	0.07
Silver	0.265	0.00276	0.0007314	0.00035	0.064	0.0000224	0.25	21	0.5	79	0.06444	0.0288369	1	1.14	0.02595675	39.7	0.00	3.97	0.01
Uranium	15.945	0.00276	0.0440082	0.015325	0.064	0.0009808	30.8	21	108.66	79	0.06444	5.948274889	1	1.14	5.25724903	1,600	0.00	160	0.03
Vanadium	19.7	0.00276	0.054372	0.0020611	0.064	0.000131911	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	68.5	0.00276	0.18906	0.0229444	0.064	0.001468444	170	21	340	79	0.06444	19.609092	1	1.14	17.3680881	224	0.08	10.5	**1.65**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 41. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.65	0.00469	0.0030485	0.002817	0.537	0.00151255	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	9.2	0.00469	0.043148	0.002128	0.537	0.001142617	8	61	2	39	0.13331	0.7545346	1	6.55	0.121958048	9.63	0.01	1.91	0.06
Barium	79.925	0.00469	0.37484825	0.041011	0.537	0.022022967	250	61	38.5	39	0.13331	22.3314247	1	6.55	3.469968835	51	0.07	5.1	0.68
Beryllium	0.755	0.00469	0.00354095	0.00005	0.537	0.00002685	4.8	61	0.85	39	0.13331	0.43452395	1	6.55	0.066884236	6.2	0.01	0.62	0.11
Cadmium	0.35375	0.00469	0.001659088	0.00085	0.537	0.00045645	12.9	61	2.3	39	0.13331	1.16859546	1	6.55	0.178734503	2.3	0.08	0.23	0.78
Cobalt	8.375	0.00469	0.03927875	0.000662	0.537	0.000355613	11.3	61	2.3	39	0.13331	1.0384849	1	6.55	0.164598361	20	0.01	5	0.03
Copper	12.05	0.00469	0.0565145	0.005144	0.537	0.002762567	36	61	20	39	0.13331	3.9673056	1	6.55	0.614745445	35.4	0.02	24.3	0.03
Manganese	1328	0.00469	6.22832	0.062622	0.537	0.033628133	38800	61	4120	39	0.13331	3369.38359	1	6.55	515.3657307	268	**1.92**	83	**6.21**
Nickel	22.8	0.00469	0.106932	0.003728	0.537	0.002001817	140	61	19	39	0.13331	12.3725011	1	6.55	1.905562583	42.1	0.05	23.1	0.08
Selenium	0.55	0.00469	0.0025795	0.0005	0.537	0.0002685	0.5	61	0.4	39	0.13331	0.06145591	1	6.55	0.009817391	0.25	0.04	0.025	0.39
Silver	0.265	0.00469	0.00124285	0.00035	0.537	0.00018795	0.5	61	0.25	39	0.13331	0.05365728	1	6.55	0.008410393	2.7	0.00	0.27	0.03
Uranium	15.945	0.00469	0.07478205	0.015325	0.537	0.008229525	108.66	61	30.8	39	0.13331	10.4372249	1	6.55	1.60614298	5	0.32	0.5	**3.21**
Vanadium	19.7	0.00469	0.092393	0.002061	0.537	0.001106817	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	68.5	0.00469	0.321265	0.022944	0.537	0.012321167	340	61	170	39	0.13331	36.486947	1	6.55	5.621455445	225	0.02	22.5	0.25

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PC 43. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
Antimony	0.65	0.00369	0.0023985	0.0028167	0.116	0.000326733	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	9.2	0.00369	0.033948	0.0021278	0.116	0.000246822	8	100	0.36531	2.92248	1	1.191	2.482514544	9.63	0.26	1.91	**1.30**
Barium	79.925	0.00369	0.29492325	0.0410111	0.116	0.004757289	250	100	0.36531	91.3275	1	1.191	76.93298114	51	**1.51**	5.1	**15.08**
Beryllium	0.755	0.00369	0.00278595	0.00005	0.116	0.0000058	4.8	100	0.36531	1.753488	1	1.191	1.474626154	6.2	0.24	0.62	**2.38**
Cadmium	0.35375	0.00369	0.001305338	0.00085	0.116	0.0000986	12.9	100	0.36531	4.712499	1	1.191	3.957936975	2.3	**1.72**	0.23	**17.21**
Cobalt	8.375	0.00369	0.03090375	0.0006622	0.116	7.68178E-05	11.3	100	0.36531	4.128003	1	1.191	3.492009713	20	0.17	5	0.70
Copper	12.05	0.00369	0.0444645	0.0051444	0.116	0.000596756	36	100	0.36531	13.15116	1	1.191	11.07995068	35.4	0.31	24.3	0.46
Manganese	1328	0.00369	4.90032	0.0626222	0.116	0.007264178	38800	100	0.36531	14174.028	1	1.191	11905.06766	268	**44.42**	83	**143.43**
Nickel	22.8	0.00369	0.084132	0.0037278	0.116	0.000432422	140	100	0.36531	51.1434	1	1.191	43.01256459	42.1	**1.02**	23.1	**1.86**
Selenium	0.55	0.00369	0.0020295	0.0005	0.116	0.000058	0.5	100	0.36531	0.182655	1	1.191	0.155115449	0.25	0.62	0.025	**6.20**
Silver	0.265	0.00369	0.00097785	0.00035	0.116	0.0000406	0.5	100	0.36531	0.182655	1	1.191	0.154217842	2.7	0.06	0.27	0.57
Uranium	15.945	0.00369	0.05883705	0.015325	0.116	0.0017777	108.66	100	0.36531	39.69356	1	1.191	33.37881972	5	**6.68**	0.5	**66.76**
Vanadium	19.7	0.00369	0.072693	0.0020611	0.116	0.000239089	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	68.5	0.00369	0.252765	0.0229444	0.116	0.002661556	340	100	0.36531	124.2054	1	1.191	104.5011138	225	0.46	22.5	**4.64**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 48. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	1.20	0.0004	0.00048	0.001792	0.127	0.000227542	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	9.50	0.0004	0.0038	0.002313	0.127	0.000293793	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	183.43	0.0004	0.07337	0.04468	0.127	0.00567436	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	2.01	0.0004	0.000805	0.00005	0.127	0.00000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	6.13	0.0004	0.00245	0.001338	0.127	0.000169942	73	0.097683125	100	0.2376	0.02320951	1	0.955	0.027046547	2.3	0.012	0.23	0.118
Cobalt	23.21	0.0004	0.009283	0.00065	0.127	0.00008255	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	16.43	0.0004	0.00657	0.010444	0.127	0.001326356	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	16285.00	0.0004	6.514	1.846	0.127	0.234442	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	184.25	0.0004	0.0737	0.047067	0.127	0.005977467	61	2.871066667	100	0.2376	0.68216544	1	0.955	0.797741264	42.1	0.019	23.1	0.035
Selenium	9.05	0.0004	0.00362	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.30	0.0004	0.000119	0.01	0.127	0.00127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	52.10	0.0004	0.02084	0.04926	0.127	0.00625602	50	2.463	100	0.2376	0.5852088	1	0.955	0.64115688	5	0.128	0.5	**1.282**
Vanadium	31.40	0.0004	0.01256	0.00043	0.127	0.00005461	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	238.50	0.0004	0.0954	0.047844	0.127	0.006076156	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 35. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
Antimony	1.20	0.000506	0.0006072	0.001792	0.109	0.000195292	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	9.50	0.000506	0.004807	0.002313	0.109	0.000252153	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	183.43	0.000506	0.09281305	0.04468	0.109	0.00487012	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	2.01	0.000506	0.001018325	0.00005	0.109	0.00000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	6.13	0.000506	0.00309925	0.001338	0.109	0.000145856	73	0.097683125	100	0.300494	0.02935319	1	2.52	0.012935833	3.4	0.0038	0.85	0.015
Cobalt	23.21	0.000506	0.011742995	0.00065	0.109	0.00007085	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	16.43	0.000506	0.00831105	0.010444	0.109	0.001138369	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	16285.00	0.000506	8.24021	1.846	0.109	0.201214	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	184.25	0.000506	0.0932305	0.047067	0.109	0.005130267	61	2.871066667	100	0.300494	0.86273831	1	2.52	0.381388521	79	0.0048	57.2	0.007
Selenium	9.05	0.000506	0.0045793	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.30	0.000506	0.000150535	0.01	0.109	0.00109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	52.10	0.000506	0.0263626	0.04926	0.109	0.00536934	50	2.463	100	0.300494	0.74011672	1	2.52	0.306289152	1,600	0.0002	160	0.002
Vanadium	31.40	0.000506	0.0158884	0.00043	0.109	0.00004687	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	238.50	0.000506	0.120681	0.047844	0.109	0.005214969	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 35. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
Antimony	1.20	0.000869	0.0010428	0.0017917	0.166	0.000297417	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	9.50	0.000869	0.0082555	0.0023133	0.166	0.000384013	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	183.43	0.000869	0.159396325	0.04468	0.166	0.00741688	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	2.01	0.000869	0.001748863	0.00005	0.166	0.0000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	6.13	0.000869	0.005322625	0.0013381	0.166	0.000222129	73	0.097683125	100	0.516131	0.050417289	1	4.7	0.01190682	3.4	0.004	0.85	0.014
Cobalt	23.21	0.000869	0.020167318	0.00065	0.166	0.0001079	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	16.43	0.000869	0.014273325	0.0104438	0.166	0.001733663	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	16285.00	0.000869	14.151665	1.846	0.166	0.306436	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	184.25	0.000869	0.16011325	0.0470667	0.166	0.007813067	61	2.871066667	100	0.516131	1.48184651	1	4.7	0.3510155	79	0.004	57.2	0.006
Selenium	9.05	0.000869	0.00786445	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.30	0.000869	0.000258528	0.01	0.166	0.00166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	52.10	0.000869	0.0452749	0.04926	0.166	0.00817716	50	2.463	100	0.516131	1.271230653	1	4.7	0.28184739	1,600	0.000	160	0.002
Vanadium	31.40	0.000869	0.0272866	0.00043	0.166	0.00007138	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	238.50	0.000869	0.2072565	0.0478438	0.166	0.007942063	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE Pk 38. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.20	0.00276	0.003312	0.0017917	0.064	0.000114667	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	9.50	0.00276	0.02622	0.0023133	0.064	0.000148053	4.7	21	3	79	0.06444	0.21632508	1	1.14	0.21288871	22.8	0.01	5.7	0.04
Barium	183.43	0.00276	0.506253	0.04468	0.064	0.00285952	43	21	75	79	0.06444	4.3999632	1	1.14	4.30620677	416.5	0.01	208.3	0.02
Beryllium	2.01	0.00276	0.0055545	0.00005	0.064	0.0000032	0.52	21	3	79	0.06444	0.159759648	1	1.14	0.14501522	NS	N/A	NS	N/A
Cadmium	6.13	0.00276	0.016905	0.0013381	0.064	0.00008564	8.5	21	3.8	79	0.06444	0.30847428	1	1.14	0.28549554	3.4	0.08	0.85	0.34
Cobalt	23.21	0.00276	0.0640527	0.00065	0.064	0.0000416	9.69	21	10.3	79	0.06444	0.655477236	1	1.14	0.6312031	43.9	0.01	23.1	0.03
Copper	16.43	0.00276	0.045333	0.0104438	0.064	0.0006684	15.5	21	30	79	0.06444	1.7369802	1	1.14	1.56401895	33.2	0.05	26.9	0.06
Manganese	16285.00	0.00276	44.9466	1.846	0.064	0.118144	1640	21	8820	79	0.06444	471.198168	1	1.14	452.862204	9770	0.05	977	0.46
Nickel	184.25	0.00276	0.50853	0.0470667	0.064	0.003012267	18	21	66	79	0.06444	3.6034848	1	1.14	3.60967287	79	0.05	57.2	0.06
Selenium	9.05	0.00276	0.024978	0.0005	0.064	0.000032	7.8	21	0.3	79	0.06444	0.120825	1	1.14	0.12792544	0.8	0.16	0.4	0.32
Silver	0.30	0.00276	0.0008211	0.01	0.064	0.00064	0.78	21	0.1	79	0.06444	0.015646032	1	1.14	0.01500626	39.7	0.00	3.97	0.00
Uranium	52.10	0.00276	0.143796	0.04926	0.064	0.00315264	20.8	21	121.03	79	0.06444	6.442829504	1	1.14	5.78050714	1,600	0.00	160	0.04
Vanadium	31.40	0.00276	0.086664	0.00043	0.064	0.00002752	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	238.50	0.00276	0.65826	0.0478438	0.064	0.003062	132	21	163	79	0.06444	10.0842156	1	1.14	9.42591018	224	0.04	10.5	0.90

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PG 38. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	1.20	0.00469	0.005628	0.001792	0.537	0.000962125	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	9.50	0.00469	0.044555	0.002313	0.537	0.00124226	3	61	4.7	39	0.13331	0.48831453	1	6.55	0.081543785	9.63	0.01	1.91	0.04
Barium	183.43	0.00469	0.86026325	0.04468	0.537	0.02399316	75	61	43	39	0.13331	8.3345412	1	6.55	1.407450017	51	0.03	5.1	0.28
Beryllium	2.01	0.00469	0.009438625	0.00005	0.537	0.00002685	3	61	0.52	39	0.13331	0.27099257	1	6.55	0.042818022	6.2	0.01	0.62	0.07
Cadmium	6.13	0.00469	0.02872625	0.001338	0.537	0.000718573	3.8	61	8.5	39	0.13331	0.75093523	1	6.55	0.119141993	2.3	0.05	0.23	0.52
Cobalt	23.21	0.00469	0.108843175	0.00065	0.537	0.00034905	10.3	61	9.69	39	0.13331	1.34137855	1	6.55	0.221461187	20	0.01	5	0.04
Copper	16.43	0.00469	0.07703325	0.010444	0.537	0.005608294	30	61	15.5	39	0.13331	3.24543195	1	6.55	0.508102823	35.4	0.01	24.3	0.02
Manganese	16285.00	0.00469	76.37665	1.846	0.537	0.991302	8820	61	1640	39	0.13331	802.499538	1	6.55	134.3309145	268	0.50	83	**1.62**
Nickel	184.25	0.00469	0.8641325	0.047067	0.537	0.0252748	66	61	18	39	0.13331	6.3028968	1	6.55	1.098061695	42.1	0.03	23.1	0.05
Selenium	9.05	0.00469	0.0424445	0.0005	0.537	0.0002685	0.3	61	7.8	39	0.13331	0.42992475	1	6.55	0.072158435	0.25	0.29	0.025	**2.89**
Silver	0.30	0.00469	0.001395275	0.01	0.537	0.00537	0.1	61	0.78	39	0.13331	0.04868481	1	6.55	0.008465662	2.7	0.00	0.27	0.03
Uranium	52.10	0.00469	0.244349	0.04926	0.537	0.02645262	121.03	61	20.8	39	0.13331	10.9234754	1	6.55	1.709049924	5	0.34	0.5	**3.42**
Vanadium	31.40	0.00469	0.147266	0.00043	0.537	0.00023091	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	238.50	0.00469	1.118565	0.047844	0.537	0.025692094	163	61	132	39	0.13331	20.1178121	1	6.55	3.246117434	225	0.01	22.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 40. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
Antimony	1.20	0.00369	0.004428	0.001792	0.116	0.000207833	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	9.50	0.00369	0.035055	0.002313	0.116	0.000268347	3	100	0.36531	1.09593	1	1.191	0.949834884	9.63	0.10	**1.91**	0.50
Barium	183.43	0.00369	0.67683825	0.04468	0.116	0.00518288	75	100	0.36531	27.39825	1	1.191	23.57705385	51	0.46	**5.1**	**4.62**
Beryllium	2.01	0.00369	0.007426125	0.00005	0.116	0.0000058	3	100	0.36531	1.09593	1	1.191	0.926416394	6.2	0.15	0.62	**1.49**
Cadmium	6.13	0.00369	0.02260125	0.001338	0.116	0.000155223	3.8	100	0.36531	1.388178	1	1.191	1.184663705	2.3	0.52	0.23	**5.15**
Cobalt	23.21	0.00369	0.085635675	0.00065	0.116	0.0000754	10.3	100	0.36531	3.762693	1	1.191	3.231237678	20	0.16	**5**	0.65
Copper	16.43	0.00369	0.06060825	0.010444	0.116	0.001211475	30	100	0.36531	10.9593	1	1.191	9.253668955	35.4	0.26	**24.3**	0.38
Manganese	16285.00	0.00369	60.09165	1.846	0.116	0.214136	8820	100	0.36531	3222.0342	1	1.191	2755.952969	268	**10.28**	**83**	**33.20**
Nickel	184.25	0.00369	0.6798825	0.047067	0.116	0.005459733	66	100	0.36531	24.11046	1	1.191	20.81931338	42.1	0.49	**23.1**	0.90
Selenium	9.05	0.00369	0.0333945	0.0005	0.116	0.000058	0.3	100	0.36531	0.109593	1	1.191	0.120105374	0.25	0.48	0.025	**4.80**
Silver	0.30	0.00369	0.001097775	0.01	0.116	0.00116	0.1	100	0.36531	0.036531	1	1.191	0.032568241	2.7	0.01	0.27	0.12
Uranium	52.10	0.00369	0.192249	0.04926	0.116	0.00571416	121.03	100	0.36531	44.213532	1	1.191	37.28924878	5	**7.46**	0.5	**74.58**
Vanadium	31.40	0.00369	0.115866	0.00043	0.116	0.00004988	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	238.50	0.00369	0.880065	0.047844	0.116	0.005549875	163	100	0.36531	59.54553	1	1.191	50.73983617	225	0.23	**22.5**	**2.26**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 50. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.60	0.0004	0.00024	0.003233	0.127	0.000410633	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	7.96	0.0004	0.003183529	0.002216	0.127	0.000281423	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	76.18	0.0004	0.030470588	0.0451	0.127	0.0057277	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	0.61	0.0004	0.000242118	0.00005	0.127	0.00000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	1.01	0.0004	0.000402235	0.000752	0.127	9.55566E-05	73	0.054926207	100	0.2376	0.01305047	1	0.955	0.014186658	2.3	0.006	0.23	0.062
Cobalt	12.07	0.0004	0.004828471	0.00025	0.127	0.00003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	5.09	0.0004	0.002037647	0.005	0.127	0.000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	5,086.47	0.0004	2.034588235	0.169	0.127	0.021463	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	45.26	0.0004	0.018103529	0.008706	0.127	0.001105606	61	0.531038889	100	0.2376	0.12617484	1	0.955	0.152234529	42.1	0.004	23.1	0.007
Selenium	2.75	0.0004	0.001101059	0.0046	0.127	0.0005842	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.09	0.0004	0.000036	0.01	0.127	0.00127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	16.36	0.0004	0.006543	0.02	0.127	0.00254	50	1	100	0.2376	0.2376	1	0.955	0.258306806	5	0.052	0.5	0.517
Vanadium	13.72	0.0004	0.005488	0.001767	0.127	0.000224367	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	69.55	0.0004	0.027818824	0.017	0.127	0.002159	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 37. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
Antimony	0.60	0.000506	0.0003036	0.003233	0.109	0.000352433	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	7.96	0.000506	0.004027165	0.002216	0.109	0.000241536	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	76.18	0.000506	0.038545294	0.0451	0.109	0.0049159	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	0.61	0.000506	0.000306279	0.00005	0.109	0.00000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	1.01	0.000506	0.000508828	0.000752	0.109	8.20131E-05	73	0.054926207	100	0.300494	0.016505	1	2.52	0.006784062	3.4	0.0020	0.85	0.008
Cobalt	12.07	0.000506	0.006108015	0.00025	0.109	0.00002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	5.09	0.000506	0.002577624	0.005	0.109	0.000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	5,086.47	0.000506	2.573754118	0.169	0.109	0.018421	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	45.26	0.000506	0.022900965	0.008706	0.109	0.000948906	61	0.531038889	100	0.300494	0.159574	1	2.52	0.07278725	79	0.0009	57.2	0.001
Selenium	2.75	0.000506	0.001392839	0.0046	0.109	0.0005014	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.09	0.000506	0.00004554	0.01	0.109	0.00109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	16.36	0.000506	0.008276895	0.02	0.109	0.00218	50	1	100	0.300494	0.300494	1	2.52	0.123393212	1,600	0.0001	160	0.001
Vanadium	13.72	0.000506	0.00694232	0.001767	0.109	0.000192567	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	69.55	0.000506	0.035190812	0.017	0.109	0.001853	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 37. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.60	0.000869	0.0005214	0.0032333	0.166	0.000536733	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	7.96	0.000869	0.006916218	0.0022159	0.166	0.000367844	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	76.18	0.000869	0.066197353	0.0451	0.166	0.0074866	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	0.61	0.000869	0.000526001	0.00005	0.166	0.0000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	1.01	0.000869	0.000873856	0.0007524	0.166	0.000124901	73	0.054926207	100	0.516131	0.028349118	1	4.7	0.00624423	3.4	0.002	0.85	0.007
Cobalt	12.07	0.000869	0.010489852	0.00025	0.166	0.0000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	5.09	0.000869	0.004426788	0.005	0.166	0.00083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	5,086.47	0.000869	4.420142941	0.169	0.166	0.028054	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	45.26	0.000869	0.039329918	0.0087056	0.166	0.001445122	61	0.531038889	100	0.516131	0.274085633	1	4.7	0.06699163	79	0.001	57.2	0.001
Selenium	2.75	0.000869	0.00239205	0.0046	0.166	0.0007636	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.09	0.000869	0.00007821	0.01	0.166	0.00166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	16.36	0.000869	0.014214668	0.02	0.166	0.00332	50	1	100	0.516131	0.516131	1	4.7	0.11354589	1,600	0.000	160	0.001
Vanadium	13.72	0.000869	0.01192268	0.0017667	0.166	0.000293267	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	69.55	0.000869	0.060436394	0.017	0.166	0.002822	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 40. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.60	0.00276	0.001656	0.0032333	0.064	0.000206933	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	7.96	0.00276	0.021966353	0.0022159	0.064	0.000141819	2	21	8	79	0.06444	0.4343256	1	1.14	0.4003805	22.8	0.02	5.7	0.07
Barium	76.18	0.00276	0.210247059	0.0451	0.064	0.0028864	38.5	21	250	79	0.06444	13.2478974	1	1.14	11.8079218	416.5	0.03	208.3	0.06
Beryllium	0.61	0.00276	0.001670612	0.00005	0.064	0.0000032	0.85	21	4.8	79	0.06444	0.25585902	1	1.14	0.22590599	NS	N/A	NS	N/A
Cadmium	1.01	0.00276	0.002775424	0.0007524	0.064	4.81545E-05	2.3	21	12.9	79	0.06444	0.68783256	1	1.14	0.60583872	3.4	0.18	0.85	0.71
Cobalt	12.07	0.00276	0.033316447	0.00025	0.064	0.000016	2.3	21	11.3	79	0.06444	0.6063804	1	1.14	0.56115162	43.9	0.01	23.1	0.02
Copper	5.09	0.00276	0.014059765	0.005	0.064	0.00032	20	21	36	79	0.06444	2.1033216	1	1.14	1.85763278	33.2	0.06	26.9	0.07
Manganese	5,086.47	0.00276	14.03865882	0.169	0.064	0.010816	4120	21	38800	79	0.06444	2030.968368	1	1.14	1793.8753	9770	0.18	977	**1.84**
Nickel	45.26	0.00276	0.124914353	0.0087056	0.064	0.000557156	19	21	140	79	0.06444	7.3841796	1	1.14	6.58741325	79	0.08	57.2	0.12
Selenium	2.75	0.00276	0.007597306	0.0046	0.064	0.0002944	0.4	21	0.5	79	0.06444	0.03086676	1	1.14	0.03399865	0.8	0.04	0.4	0.08
Silver	0.09	0.00276	0.0002484	0.01	0.064	0.00064	0.25	21	0.5	79	0.06444	0.0288369	1	1.14	0.02607482	39.7	0.00	3.97	0.01
Uranium	16.36	0.00276	0.0451467	0.02	0.064	0.00128	30.8	21	108.66	79	0.06444	5.948274889	1	1.14	5.25851017	1,600	0.00	160	0.03
Vanadium	13.72	0.00276	0.0378672	0.0017667	0.064	0.000113067	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	69.55	0.00276	0.191949882	0.017	0.064	0.001088	170	21	340	79	0.06444	19.609092	1	1.14	17.3702894	224	0.08	10.5	**1.65**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 40. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.60	0.00469	0.002814	0.003233	0.537	0.0017363	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	7.96	0.00469	0.037326882	0.002216	0.537	0.001189952	8	61	2	39	0.13331	0.7545346	1	6.55	0.121076555	9.63	0.01	1.91	0.06
Barium	76.18	0.00469	0.357267647	0.0451	0.537	0.0242187	250	61	38.5	39	0.13331	22.3314247	1	6.55	3.46762	51	0.07	5.1	0.68
Beryllium	0.61	0.00469	0.002838829	0.00005	0.537	0.00002685	4.8	61	0.85	39	0.13331	0.43452395	1	6.55	0.066777042	6.2	0.01	0.62	0.11
Cadmium	1.01	0.00469	0.004716209	0.000752	0.537	0.000404046	12.9	61	2.3	39	0.13331	1.16859546	1	6.55	0.179193239	2.3	0.08	0.23	0.78
Cobalt	12.07	0.00469	0.056613818	0.00025	0.537	0.00013425	11.3	61	2.3	39	0.13331	1.0384849	1	6.55	0.16721114	20	0.01	5	0.03
Copper	5.09	0.00469	0.023891412	0.005	0.537	0.002685	36	61	20	39	0.13331	3.9673056	1	6.55	0.609752979	35.4	0.02	24.3	0.03
Manganese	5,086.47	0.00469	23.85554706	0.169	0.537	0.090753	38800	61	4120	39	0.13331	3369.38359	1	6.55	518.0656318	268	**1.93**	83	**6.24**
Nickel	45.26	0.00469	0.212263882	0.008706	0.537	0.004674883	140	61	19	39	0.13331	12.3725011	1	6.55	1.922051888	42.1	0.05	23.1	0.08
Selenium	2.75	0.00469	0.012909915	0.0046	0.537	0.0024702	0.5	61	0.4	39	0.13331	0.06145591	1	6.55	0.011730691	0.25	0.05	0.025	0.47
Silver	0.09	0.00469	0.0004221	0.01	0.537	0.00537	0.5	61	0.25	39	0.13331	0.05365728	1	6.55	0.00907624	2.7	0.00	0.27	0.03
Uranium	16.36	0.00469	0.076716675	0.02	0.537	0.01074	108.66	61	30.8	39	0.13331	10.4372249	1	6.55	1.606821621	5	0.32	0.5	**3.21**
Vanadium	13.72	0.00469	0.0643468	0.001767	0.537	0.0009487	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	69.55	0.00469	0.326175706	0.017	0.537	0.009129	340	61	170	39	0.13331	36.486947	1	6.55	5.621717818	225	0.02	22.5	0.25

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 42. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
Antimony	0.60	0.00369	0.002214	0.003233	0.116	0.000375067	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	7.96	0.00369	0.029368059	0.002216	0.116	0.000257047	8	100	0.36531	2.92248	1	1.191	2.478677671	9.63	0.26	1.91	**1.30**
Barium	76.18	0.00369	0.281091176	0.0451	0.116	0.0052316	250	100	0.36531	91.3275	1	1.191	76.92176556	51	**1.51**	5.1	**15.08**
Beryllium	0.61	0.00369	0.002233535	0.00005	0.116	0.0000058	4.8	100	0.36531	1.753488	1	1.191	1.47416233	6.2	0.24	0.62	**2.38**
Cadmium	1.01	0.00369	0.003710621	0.000752	0.116	8.728E-05	12.9	100	0.36531	4.712499	1	1.191	3.95994702	2.3	**1.72**	0.23	**17.22**
Cobalt	12.07	0.00369	0.044542641	0.00025	0.116	0.000029	11.3	100	0.36531	4.128003	1	1.191	3.503421193	20	0.18	5	0.70
Copper	5.09	0.00369	0.018797294	0.005	0.116	0.00058	36	100	0.36531	13.15116	1	1.191	11.05838564	35.4	0.31	24.3	0.46
Manganese	5,086.47	0.00369	18.76907647	0.169	0.116	0.019604	38800	100	0.36531	14174.028	1	1.191	11916.72265	268	**44.47**	83	**143.57**
Nickel	45.26	0.00369	0.167005059	0.008706	0.116	0.001009844	140	100	0.36531	51.1434	1	1.191	43.08263216	42.1	**1.02**	23.1	**1.87**
Selenium	2.75	0.00369	0.010157268	0.0046	0.116	0.0005336	0.5	100	0.36531	0.182655	1	1.191	0.1623391	0.25	0.65	0.025	**6.49**
Silver	0.09	0.00369	0.0003321	0.01	0.116	0.00116	0.5	100	0.36531	0.182655	1	1.191	0.154615533	2.7	0.06	0.27	0.57
Uranium	16.36	0.00369	0.060359175	0.02	0.116	0.00232	108.66	100	0.36531	39.69356	1	1.191	33.38055308	5	**6.68**	0.5	**66.76**
Vanadium	13.72	0.00369	0.0506268	0.001767	0.116	0.000204933	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	69.55	0.00369	0.256628647	0.017	0.116	0.001972	340	100	0.36531	124.2054	1	1.191	104.5037789	225	0.46	22.5	**4.64**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 44. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	1.8	0.0004	0.00072	0.0029667	0.127	0.000376767	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	82.1	0.0004	0.03284	0.0012033	0.127	0.000152823	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	112	0.0004	0.0448	0.0669	0.127	0.0084963	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	0.95	0.0004	0.00038	0.000085	0.127	0.000010795	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.75	0.0004	0.0003	0.0003733	0.127	4.74133E-05	73	0.027253333	100	0.2376	0.00647539	1	0.955	0.007144299	2.3	0.003	0.23	0.031
Cobalt	23.1	0.0004	0.00924	0.0011667	0.127	0.000148167	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	57.5	0.0004	0.023	0.0031	0.127	0.0003937	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	3090	0.0004	1.236	0.2956667	0.127	0.037549667	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	37.1	0.0004	0.01484	0.0023	0.127	0.0002921	61	0.1403	100	0.2376	0.03333528	1	0.955	0.050751183	42.1	0.001	23.1	0.002
Selenium	0.6	0.0004	0.00024	0.00065	0.127	0.00008255	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.31	0.0004	0.000124	0.0007667	0.127	9.73667E-05	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	406	0.0004	0.1624	0.1333333	0.127	0.016933333	50	6.666666665	100	0.2376	1.584	1	0.955	1.846422338	5	0.369	0.5	**3.693**
Vanadium	32.8	0.0004	0.01312	0.00025	0.127	0.00003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	142	0.0004	0.0568	0.0047	0.127	0.0005969	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 31. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
Antimony	1.8	0.000506	0.0009108	0.0029667	0.109	0.000323367	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	82.1	0.000506	0.0415426	0.0012033	0.109	0.000131163	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	112	0.000506	0.056672	0.0669	0.109	0.0072921	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	0.95	0.000506	0.0004807	0.000085	0.109	0.000009265	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.75	0.000506	0.0003795	0.0003733	0.109	4.06933E-05	73	0.027253333	100	0.300494	0.00818946	1	2.52	0.00341653	3.4	0.0010	0.85	0.004
Cobalt	23.1	0.000506	0.0116886	0.0011667	0.109	0.000127167	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	57.5	0.000506	0.029095	0.0031	0.109	0.0003379	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	3090	0.000506	1.56354	0.2956667	0.109	0.032227667	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	37.1	0.000506	0.0187726	0.0023	0.109	0.0002507	61	0.1403	100	0.300494	0.04215931	1	2.52	0.024278813	79	0.0003	57.2	0.000
Selenium	0.6	0.000506	0.0003036	0.00065	0.109	0.00007085	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.31	0.000506	0.00015686	0.0007667	0.109	8.35667E-05	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	406	0.000506	0.205436	0.1333333	0.109	0.014533333	50	6.666666665	100	0.300494	2.00329333	1	2.52	0.88224709	1,600	0.0006	160	0.006
Vanadium	32.8	0.000506	0.0165968	0.00025	0.109	0.00002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	142	0.000506	0.071852	0.0047	0.109	0.0005123	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 31. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Outfall Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.8	0.000869	0.0015642	0.0029667	0.166	0.000492467	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	82.1	0.000869	0.0713449	0.0012033	0.166	0.000199753	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	112	0.000869	0.097328	0.0669	0.166	0.0111054	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	0.95	0.000869	0.00082555	0.000085	0.166	0.00001411	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.75	0.000869	0.00065175	0.0003733	0.166	6.19733E-05	73	0.027253333	100	0.516131	0.01406629	1	4.7	0.00314468	3.4	0.001	0.85	0.004
Cobalt	23.1	0.000869	0.0200739	0.0011667	0.166	0.000193667	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	57.5	0.000869	0.0499675	0.0031	0.166	0.0005146	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	3090	0.000869	2.68521	0.2956667	0.166	0.049080667	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	37.1	0.000869	0.0322399	0.0023	0.166	0.0003818	61	0.1403	100	0.516131	0.072413179	1	4.7	0.02234785	79	0.000	57.2	0.000
Selenium	0.6	0.000869	0.0005214	0.00065	0.166	0.0001079	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.31	0.000869	0.00026939	0.0007667	0.166	0.000127267	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	406	0.000869	0.352814	0.1333333	0.166	0.022133333	50	6.666666665	100	0.516131	3.440873332	1	4.7	0.81187674	1,600	0.001	160	0.005
Vanadium	32.8	0.000869	0.0285032	0.00025	0.166	0.0000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	142	0.000869	0.123398	0.0047	0.166	0.0007802	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 42. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.0004	0.00026	0.0025	0.127	0.0003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	15.55	0.0004	0.00622	0.009378	0.127	0.001190978	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	368.2	0.0004	0.14728	0.008828	0.127	0.001121128	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	15.7	0.0004	0.00628	0.038789	0.127	0.004926189	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	5.665	0.0004	0.002266	0.044516	0.127	0.005653505	73	3.249652631	100	0.2376	0.77211747	1	0.955	0.816792639	2.3	0.355	0.23	**3.551**
Cobalt	86.95	0.0004	0.03478	1.196	0.127	0.151892	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	390	0.0004	0.156	0.275158	0.127	0.034945053	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	2386	0.0004	0.9544	88.96316	0.127	11.29832105	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	387.25	0.0004	0.1549	1.748	0.127	0.221996	61	106.628	100	0.2376	25.3348128	1	0.955	26.92325529	42.1	0.640	23.1	**1.166**
Selenium	0.5	0.0004	0.0002	0.008144	0.127	0.001034344	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.26	0.0004	0.000104	0.005	0.127	0.000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	2920.45	0.0004	1.16818	17.978	0.127	2.283206	50	898.9	100	0.2376	213.57864	1	0.955	227.2565717	5	**45.451**	0.5	**454.513**
Vanadium	8.55	0.0004	0.00342	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	528.55	0.0004	0.21142	3.774	0.127	0.479298	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 29. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000506	0.0003289	0.0025	0.109	0.0002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	15.55	0.000506	0.0078683	0.009378	0.109	0.001022178	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	368.2	0.000506	0.1863092	0.008828	0.109	0.000962228	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	15.7	0.000506	0.0079442	0.038789	0.109	0.004227989	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	5.665	0.000506	0.00286649	0.044516	0.109	0.004852221	73	3.249652631	100	0.300494	0.97650112	1	2.52	0.390563424	3.4	0.1149	0.85	0.459
Cobalt	86.95	0.000506	0.0439967	1.196	0.109	0.130364	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	390	0.000506	0.19734	0.275158	0.109	0.029992211	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	2386	0.000506	1.207316	88.96316	0.109	9.696984211	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	387.25	0.000506	0.1959485	1.748	0.109	0.190532	61	106.628	100	0.300494	32.0410742	1	2.52	12.86807727	79	0.1629	57.2	0.225
Selenium	0.5	0.000506	0.000253	0.008144	0.109	0.000887744	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.26	0.000506	0.00013156	0.005	0.109	0.000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	2920.45	0.000506	1.4777477	17.978	0.109	1.959602	50	898.9	100	0.300494	270.114057	1	2.52	108.5521454	1,600	0.0678	160	0.678
Vanadium	8.55	0.000506	0.0043263	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	528.55	0.000506	0.2674463	3.774	0.109	0.411366	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 29. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000869	0.00056485	0.0025	0.166	0.000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	15.55	0.000869	0.01351295	0.0093778	0.166	0.001556711	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	368.2	0.000869	0.3199658	0.0088278	0.166	0.001465411	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	15.7	0.000869	0.0136433	0.0387889	0.166	0.006438956	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	5.665	0.000869	0.004922885	0.0445158	0.166	0.007389621	73	3.249652631	100	0.516131	1.677246462	1	4.7	0.35948063	3.4	0.106	0.85	0.423
Cobalt	86.95	0.000869	0.07555955	1.196	0.166	0.198536	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	390	0.000869	0.33891	0.2751579	0.166	0.045676211	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	2386	0.000869	2.073434	88.963158	0.166	14.76788421	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	387.25	0.000869	0.33652025	1.748	0.166	0.290168	61	106.628	100	0.516131	55.03401627	1	4.7	11.8427031	79	0.150	57.2	0.207
Selenium	0.5	0.000869	0.0004345	0.0081444	0.166	0.001351978	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.26	0.000869	0.00022594	0.005	0.166	0.00083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	2920.45	0.000869	2.53787105	17.978	0.166	2.984348	50	898.9	100	0.516131	463.9501559	1	4.7	99.8877394	1,600	0.062	160	0.624
Vanadium	8.55	0.000869	0.00742995	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	528.55	0.000869	0.45930995	3.774	0.166	0.626484	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 40. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.75	0.0004	0.0003	0.002375	0.127	0.000301625	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	28.75	0.0004	0.0115	0.011133	0.127	0.001413933	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	262.85	0.0004	0.10514	0.021192	0.127	0.002691342	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	6.5	0.0004	0.0026	0.034708	0.127	0.004407958	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.155	0.0004	0.000062	0.043423	0.127	0.005514731	73	3.169884615	100	0.2376	0.75316458	1	0.955	0.794493524	2.3	0.345	0.23	**3.454**
Cobalt	48.5	0.0004	0.0194	1.004	0.127	0.127508	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	70	0.0004	0.028	0.312846	0.127	0.039731462	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	1325	0.0004	0.53	88.253	0.127	11.208131	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	71.1	0.0004	0.02844	1.553	0.127	0.197231	61	94.733	100	0.2376	22.5085608	1	0.955	23.80547832	42.1	0.565	23.1	**1.031**
Selenium	0.6	0.0004	0.00024	0.014733	0.127	0.001871133	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.3	0.0004	0.00012	0.014625	0.127	0.001857375	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	656	0.0004	0.2624	17.554	0.127	2.229358	50	877.7	100	0.2376	208.54152	1	0.955	220.9772545	5	**44.195**	0.5	**441.955**
Vanadium	30.55	0.0004	0.01222	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	292	0.0004	0.1168	3.539	0.127	0.449453	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 27. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
MModel 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
Antimony	0.75	0.000506	0.0003795	0.002375	0.109	0.000258875	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	28.75	0.000506	0.0145475	0.011133	0.109	0.001213533	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	262.85	0.000506	0.1330021	0.021192	0.109	0.002309892	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	6.5	0.000506	0.003289	0.034708	0.109	0.003783208	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.155	0.000506	0.00007843	0.043423	0.109	0.004733115	73	3.169884615	100	0.300494	0.95253131	1	2.52	0.379897958	3.4	0.1117	0.85	0.447
Cobalt	48.5	0.000506	0.024541	1.004	0.109	0.109436	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	70	0.000506	0.03542	0.312846	0.109	0.034100231	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	1325	0.000506	0.67045	88.253	0.109	9.619577	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	71.1	0.000506	0.0359766	1.553	0.109	0.169277	61	94.733	100	0.300494	28.4666981	1	2.52	11.37775861	79	0.1440	57.2	0.199
Selenium	0.6	0.000506	0.0003036	0.014733	0.109	0.001605933	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.3	0.000506	0.0001518	0.014625	0.109	0.001594125	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	656	0.000506	0.331936	17.554	0.109	1.913386	50	877.7	100	0.300494	263.743584	1	2.52	105.5511531	1,600	0.0660	160	0.660
Vanadium	30.55	0.000506	0.0154583	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	292	0.000506	0.147752	3.539	0.109	0.385751	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 27. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.75	0.000869	0.00065175	0.002375	0.166	0.00039425	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	28.75	0.000869	0.02498375	0.0111333	0.166	0.001848133	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	262.85	0.000869	0.22841665	0.0211917	0.166	0.003517817	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	6.5	0.000869	0.0056485	0.0347083	0.166	0.005761583	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.155	0.000869	0.000134695	0.0434231	0.166	0.007208231	73	3.169884615	100	0.516131	1.636075716	1	4.7	0.34966354	3.4	0.103	0.85	0.411
Cobalt	48.5	0.000869	0.0421465	1.004	0.166	0.166664	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	70	0.000869	0.06083	0.3128462	0.166	0.051932462	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	1325	0.000869	1.151425	88.253	0.166	14.649998	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	71.1	0.000869	0.0617859	1.553	0.166	0.257798	61	94.733	100	0.516131	48.89463802	1	4.7	10.471111	79	0.133	57.2	0.183
Selenium	0.6	0.000869	0.0005214	0.0147333	0.166	0.002445733	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.3	0.000869	0.0002607	0.014625	0.166	0.00242775	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	656	0.000869	0.570064	17.554	0.166	2.913964	50	877.7	100	0.516131	453.0081787	1	4.7	97.1260014	1,600	0.061	160	0.607
Vanadium	30.55	0.000869	0.02654795	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	292	0.000869	0.253748	3.539	0.166	0.587474	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 41. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.600	0.0004	0.00024	0.0025	0.127	0.0003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	16.733	0.0004	0.006693333	0.001	0.127	0.000127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	72.467	0.0004	0.028986667	0.005982	0.127	0.000759691	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	2.233	0.0004	0.000893333	0.002105	0.127	0.000267277	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.115	0.0004	0.000046	0.0002	0.127	0.0000254	73	0.0146	100	0.2376	0.00346896	1	0.955	0.003707183	2.3	0.002	0.23	0.016
Cobalt	17.567	0.0004	0.007026667	0.001367	0.127	0.000173567	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	19.233	0.0004	0.007693333	0.007367	0.127	0.000935567	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	1074.000	0.0004	0.4296	0.659833	0.127	0.083798833	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	28.900	0.0004	0.01156	0.073409	0.127	0.009322955	61	4.477954545	100	0.2376	1.063962	1	0.955	1.135963303	42.1	0.027	23.1	0.049
Selenium	0.470	0.0004	0.000188	0.003	0.127	0.000381	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.235	0.0004	0.000094	0.01	0.127	0.00127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	420.667	0.0004	0.168266667	2.596	0.127	0.329692	50	129.8	100	0.2376	30.84048	1	0.955	32.81511902	5	**6.563**	0.5	**65.630**
Vanadium	29.333	0.0004	0.011733333	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	63.667	0.0004	0.025466667	0.0192	0.127	0.0024384	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 28. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.600	0.000506	0.0003036	0.0025	0.109	0.0002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	16.733	0.000506	0.008467067	0.001	0.109	0.000109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	72.467	0.000506	0.036668133	0.005982	0.109	0.000652018	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	2.233	0.000506	0.001130067	0.002105	0.109	0.000229395	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.115	0.000506	0.00005819	0.0002	0.109	0.0000218	73	0.0146	100	0.300494	0.00438721	1	2.52	0.001772699	3.4	0.0005	0.85	0.002
Cobalt	17.567	0.000506	0.008888733	0.001367	0.109	0.000148967	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	19.233	0.000506	0.009732067	0.007367	0.109	0.000802967	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	1,074.000	0.000506	0.543444	0.659833	0.109	0.071921833	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	28.900	0.000506	0.0146234	0.073409	0.109	0.008001591	61	4.477954545	100	0.300494	1.34559847	1	2.52	0.542945819	79	0.0069	57.2	0.009
Selenium	0.470	0.000506	0.00023782	0.003	0.109	0.000327	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.235	0.000506	0.00011891	0.01	0.109	0.00109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	420.667	0.000506	0.212857333	2.596	0.109	0.282964	50	129.8	100	0.300494	39.0041212	1	2.52	15.67458037	1,600	0.0098	160	0.098
Vanadium	29.333	0.000506	0.014842667	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	63.667	0.000506	0.032215333	0.0192	0.109	0.0020928	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 28. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.600	0.000869	0.0005214	0.0025	0.166	0.000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	16.733	0.000869	0.014541267	0.001	0.166	0.000166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	72.467	0.000869	0.062973533	0.0059818	0.166	0.000992982	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	2.233	0.000869	0.001940767	0.0021045	0.166	0.000349355	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.115	0.000869	0.000099935	0.0002	0.166	0.0000332	73	0.0146	100	0.516131	0.007535513	1	4.7	0.00163163	3.4	0.000	0.85	0.002
Cobalt	17.567	0.000869	0.015265433	0.0013667	0.166	0.000226867	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	19.233	0.000869	0.016713767	0.0073667	0.166	0.001222867	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	1,074.000	0.000869	0.933306	0.6598333	0.166	0.109532333	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	28.900	0.000869	0.0251141	0.0734091	0.166	0.012185909	61	4.477954545	100	0.516131	2.311211157	1	4.7	0.49968323	79	0.006	57.2	0.009
Selenium	0.470	0.000869	0.00040843	0.003	0.166	0.000498	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.235	0.000869	0.000204215	0.01	0.166	0.00166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	420.667	0.000869	0.365559333	2.596	0.166	0.430936	50	129.8	100	0.516131	66.9938038	1	4.7	14.4234679	1,600	0.009	160	0.090
Vanadium	29.333	0.000869	0.025490667	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	63.667	0.000869	0.055326333	0.0192	0.166	0.0031872	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PH 49. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.6	0.0004	0.00024	0.00255	0.127	0.00032385	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	3.07	0.0004	0.001228	0.001813	0.127	0.000230261	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	33.86	0.0004	0.013544	0.036546	0.127	0.004641362	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	0.32	0.0004	0.000128	0.00005	0.127	0.00000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.182	0.0004	0.0000728	0.0015	0.127	0.0001905	73	0.1095	100	0.2376	0.0260172	1	0.955	0.027518848	2.3	0.012	0.23	0.120
Cobalt	2.914	0.0004	0.0011656	0.00025	0.127	0.00003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	2.29	0.0004	0.000916	0.003889	0.127	0.000493939	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	874.6	0.0004	0.34984	0.012193	0.127	0.001548493	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	4.29	0.0004	0.001716	0.004144	0.127	0.000526268	61	0.252774615	100	0.2376	0.06005925	1	0.955	0.065237191	42.1	0.002	23.1	0.003
Selenium	2	0.0004	0.0008	0.002	0.127	0.000254	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.025	0.0004	0.00001	0.00035	0.127	0.00004445	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	10.52375	0.0004	0.0042095	0.012962	0.127	0.001646115	50	0.648076923	100	0.2376	0.15398308	1	0.955	0.167370358	5	0.033	0.5	0.335
Vanadium	9.2	0.0004	0.00368	0.002683	0.127	0.000340783	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	18.87	0.0004	0.007548	0.009143	0.127	0.001161143	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 36. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
Antimony	0.6	0.000506	0.0003036	0.00255	0.109	0.00027795	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	3.07	0.000506	0.00155342	0.001813	0.109	0.000197625	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	33.86	0.000506	0.01713316	0.036546	0.109	0.003983531	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	0.32	0.000506	0.00016192	0.00005	0.109	0.00000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.182	0.000506	0.000092092	0.0015	0.109	0.0001635	73	0.1095	100	0.300494	0.03290409	1	2.52	0.013158605	3.4	0.0039	0.85	0.015
Cobalt	2.914	0.000506	0.001474484	0.00025	0.109	0.00002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	2.29	0.000506	0.00115874	0.003889	0.109	0.000423932	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	874.6	0.000506	0.4425476	0.012193	0.109	0.001329021	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	4.29	0.000506	0.00217074	0.004144	0.109	0.000451679	61	0.252774615	100	0.300494	0.07595726	1	2.52	0.031182411	79	0.0004	57.2	0.001
Selenium	2	0.000506	0.001012	0.002	0.109	0.000218	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.025	0.000506	0.00001265	0.00035	0.109	0.00003815	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	10.52375	0.000506	0.005325018	0.012962	0.109	0.001412808	50	0.648076923	100	0.300494	0.19474323	1	2.52	0.079952798	1,600	0.0000	160	0.000
Vanadium	9.2	0.000506	0.0046552	0.002683	0.109	0.000292483	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	18.87	0.000506	0.00954822	0.009143	0.109	0.000996571	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
BAF:	Bioaccumulation factor
ND:	Not defined; database insufficient to derive values
N/A:	Value could not be calculated with the information available

TABLE PR 36. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.6	0.000869	0.0005214	0.00255	0.166	0.0004233	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	3.07	0.000869	0.00266783	0.0018131	0.166	0.000300971	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	33.86	0.000869	0.02942434	0.0365462	0.166	0.006066662	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	0.32	0.000869	0.00027808	0.00005	0.166	0.0000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.182	0.000869	0.000158158	0.0015	0.166	0.000249	73	0.1095	100	0.516131	0.056516345	1	4.7	0.01211138	3.4	0.004	0.85	0.014
Cobalt	2.914	0.000869	0.002532266	0.00025	0.166	0.0000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	2.29	0.000869	0.00199001	0.0038893	0.166	0.000645621	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	874.6	0.000869	0.7600274	0.0121929	0.166	0.002024014	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	4.29	0.000869	0.00372801	0.0041438	0.166	0.000687878	61	0.252774615	100	0.516131	0.130464815	1	4.7	0.02869802	79	0.000	57.2	0.001
Selenium	2	0.000869	0.001738	0.002	0.166	0.000332	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.025	0.000869	0.000021725	0.00035	0.166	0.0000581	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	10.52375	0.000869	0.009145139	0.0129615	0.166	0.002151615	50	0.648076923	100	0.516131	0.33449259	1	4.7	0.0735722	1,600	0.000	160	0.000
Vanadium	9.2	0.000869	0.0079948	0.0026833	0.166	0.000445433	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	18.87	0.000869	0.01639803	0.0091429	0.166	0.001517714	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
BAF:	Bioaccumulation factor
ND:	Not defined; database insufficient to derive values
N/A:	Value could not be calculated with the information available

TABLE PK 39. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
Antimony	0.6	0.00276	0.001656	0.00255	0.064	0.0001632	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	3.07	0.00276	0.0084732	0.0018131	0.064	0.000116037	1.5	21	4	79	0.06444	0.223929	1	1.14	0.20396337	22.8	0.01	5.7	0.04
Barium	33.86	0.00276	0.0934536	0.0365462	0.064	0.002338954	147	21	463	79	0.06444	25.5594816	1	1.14	22.5046265	416.5	0.05	208.3	0.11
Beryllium	0.32	0.00276	0.0008832	0.00005	0.064	0.0000032	0.15	21	0.5	79	0.06444	0.02748366	1	1.14	0.02488602	NS	N/A	NS	N/A
Cadmium	0.182	0.00276	0.00050232	0.0015	0.064	0.000096	0.6	21	0.3	79	0.06444	0.02339172	1	1.14	0.02104389	3.4	0.01	0.85	0.02
Cobalt	2.914	0.00276	0.00804264	0.00025	0.064	0.000016	2.97	21	5.2	79	0.06444	0.304910748	1	1.14	0.27453455	43.9	0.01	23.1	0.01
Copper	2.29	0.00276	0.0063204	0.0038893	0.064	0.000248914	35.6	21	32	79	0.06444	2.11079664	1	1.14	1.85733856	33.2	0.06	26.9	0.07
Manganese	874.6	0.00276	2.413896	0.0121929	0.064	0.000780343	797	21	3560	79	0.06444	192.0163788	1	1.14	170.553557	9770	0.02	977	0.17
Nickel	4.29	0.00276	0.0118404	0.0041438	0.064	0.000265206	5	21	9	79	0.06444	0.5258304	1	1.14	0.47187369	79	0.01	57.2	0.01
Selenium	2	0.00276	0.00552	0.002	0.064	0.000128	0.4	21	0.3	79	0.06444	0.02068524	1	1.14	0.02309933	0.8	0.03	0.4	0.06
Silver	0.025	0.00276	0.000069	0.00035	0.064	0.0000224	0.43	21	0.2	79	0.06444	0.016000452	1	1.14	0.01411566	39.7	0.00	3.97	0.00
Uranium	10.52375	0.00276	0.02904555	0.0129615	0.064	0.000829538	9.1	21	23.33	79	0.06444	1.310782719	1	1.14	1.17601562	1,600	0.00	160	0.01
Vanadium	9.2	0.00276	0.025392	0.0026833	0.064	0.000171733	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	18.87	0.00276	0.0520812	0.0091429	0.064	0.000585143	186	21	45	79	0.06444	4.8078684	1	1.14	4.26362697	224	0.02	10.5	0.41

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 39. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.6	0.00469	0.002814	0.00255	0.537	0.00136935	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	3.07	0.00469	0.0143983	0.001813	0.537	0.000973622	4	61	1.5	39	0.13331	0.40326275	1	6.55	0.06391369	9.63	0.01	1.91	0.03
Barium	33.86	0.00469	0.1588034	0.036546	0.537	0.019625285	463	61	147	39	0.13331	45.2934056	1	6.55	6.942264776	51	0.14	5.1	**1.36**
Beryllium	0.32	0.00469	0.0015008	0.00005	0.537	0.00002685	0.5	61	0.15	39	0.13331	0.04845819	1	6.55	0.007631425	6.2	0.00	0.62	0.01
Cadmium	0.182	0.00469	0.00085358	0.0015	0.537	0.0008055	0.3	61	0.6	39	0.13331	0.05559027	1	6.55	0.008740359	2.3	0.00	0.23	0.04
Cobalt	2.914	0.00469	0.01366666	0.00025	0.537	0.00013425	5.2	61	2.97	39	0.13331	0.57727229	1	6.55	0.090240184	20	0.00	5	0.02
Copper	2.29	0.00469	0.0107401	0.003889	0.537	0.002088546	32	61	35.6	39	0.13331	4.45308724	1	6.55	0.681819219	35.4	0.02	24.3	0.03
Manganese	874.6	0.00469	4.101874	0.012193	0.537	0.006547564	3560	61	797	39	0.13331	330.932743	1	6.55	51.15132288	268	0.19	83	0.62
Nickel	4.29	0.00469	0.0201201	0.004144	0.537	0.002225245	9	61	5	39	0.13331	0.9918264	1	6.55	0.154835381	42.1	0.00	23.1	0.01
Selenium	2	0.00469	0.00938	0.002	0.537	0.001074	0.3	61	0.4	39	0.13331	0.04519209	1	6.55	0.008495586	0.25	0.03	0.025	0.34
Silver	0.025	0.00469	0.00011725	0.00035	0.537	0.00018795	0.2	61	0.43	39	0.13331	0.03861991	1	6.55	0.005942764	2.7	0.00	0.27	0.02
Uranium	10.52375	0.00469	0.049356388	0.012962	0.537	0.006960346	23.33	61	9.1	39	0.13331	2.3702336	1	6.55	0.3704657	5	0.07	0.5	0.74
Vanadium	9.2	0.00469	0.043148	0.002683	0.537	0.00144095	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	18.87	0.00469	0.0885003	0.009143	0.537	0.004909714	45	61	186	39	0.13331	13.3296669	1	6.55	2.04932472	225	0.01	22.5	0.09

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 41. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
Antimony	0.6	0.00369	0.002214	0.00255	0.116	0.0002958	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	3.07	0.00369	0.0113283	0.001813	0.116	0.000210317	4	100	0.36531	1.46124	1	1.191	1.236589939	9.63	0.13	1.91	0.65
Barium	33.86	0.00369	0.1249434	0.036546	0.116	0.004239354	463	100	0.36531	169.13853	1	1.191	142.1223449	51	**2.79**	5.1	**27.87**
Beryllium	0.32	0.00369	0.0011808	0.00005	0.116	0.0000058	0.5	100	0.36531	0.182655	1	1.191	0.154359026	6.2	0.02	0.62	0.25
Cadmium	0.182	0.00369	0.00067158	0.0015	0.116	0.000174	0.3	100	0.36531	0.109593	1	1.191	0.092727607	2.3	0.04	0.23	0.40
Cobalt	2.914	0.00369	0.01075266	0.00025	0.116	0.000029	5.2	100	0.36531	1.899612	1	1.191	1.604024903	20	0.08	5	0.32
Copper	2.29	0.00369	0.0084501	0.003889	0.116	0.000451157	32	100	0.36531	11.68992	1	1.191	9.822687873	35.4	0.28	24.3	0.40
Manganese	874.6	0.00369	3.227274	0.012193	0.116	0.001414371	3560	100	0.36531	1300.5036	1	1.191	1094.653475	268	**4.08**	83	**13.19**
Nickel	4.29	0.00369	0.0158301	0.004144	0.116	0.000480686	9	100	0.36531	3.28779	1	1.191	2.774224002	42.1	0.07	23.1	0.12
Selenium	2	0.00369	0.00738	0.002	0.116	0.000232	0.3	100	0.36531	0.109593	1	1.191	0.0984089	0.25	0.39	0.025	**3.94**
Silver	0.025	0.00369	0.00009225	0.00035	0.116	0.0000406	0.2	100	0.36531	0.073062	1	1.191	0.061456633	2.7	0.02	0.27	0.23
Uranium	10.52375	0.00369	0.038832638	0.012962	0.116	0.001503538	23.33	100	0.36531	8.5224209	1	1.191	7.189552527	5	**1.44**	0.5	**14.38**
Vanadium	9.2	0.00369	0.033948	0.002683	0.116	0.000311267	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	18.87	0.00369	0.0696303	0.009143	0.116	0.001060571	45	100	0.36531	16.43895	1	1.191	13.86199905	225	0.06	22.5	0.62

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 47. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.65	0.0004	0.00026	0.001881	0.127	0.000238919	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	6.34	0.0004	0.002537143	0.0025	0.127	0.0003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	81.00	0.0004	0.0324	0.0549	0.127	0.0069723	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	0.72	0.0004	0.000286	0.00005	0.127	0.00000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.39	0.0004	0.000156	0.00088	0.127	0.000111794	73	0.06425973	100	0.2376	0.01526811	1	0.955	0.016267965	2.3	0.007	0.23	0.071
Cobalt	11.56	0.0004	0.004625714	0.000766	0.127	9.72344E-05	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	12.73	0.0004	0.005091429	0.0044	0.127	0.0005588	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	1,127.43	0.0004	0.450971428	0.0944	0.127	0.0119888	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	16.90	0.0004	0.00676	0.0259	0.127	0.003289336	61	1.579917428	100	0.2376	0.37538838	1	0.955	0.403599704	42.1	0.010	23.1	0.017
Selenium	0.50	0.0004	0.0002	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.23	0.0004	9.11429E-05	0.01	0.127	0.00127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	29.53	0.0004	0.0118112	0.0505	0.127	0.0064135	50	2.525	100	0.2376	0.59994	1	0.955	0.64729288	5	0.129	0.5	**1.295**
Vanadium	23.23	0.0004	0.009293333	0.001365	0.127	0.000173315	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	52.26	0.0004	0.020902857	0.029735	0.127	0.003776362	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 34. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.65	0.000506	0.0003289	0.001881	0.109	0.000205056	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	6.34	0.000506	0.003209486	0.0025	0.109	0.0002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	81.00	0.000506	0.040986	0.0549	0.109	0.0059841	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	0.72	0.000506	0.00036179	0.00005	0.109	0.00000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.39	0.000506	0.00019734	0.00088	0.109	9.59495E-05	73	0.06425973	100	0.300494	0.01930966	1	2.52	0.007778949	3.4	0.0023	0.85	0.009
Cobalt	11.56	0.000506	0.005851529	0.000766	0.109	8.34531E-05	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	12.73	0.000506	0.006440657	0.0044	0.109	0.0004796	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	1,127.43	0.000506	0.570478857	0.0944	0.109	0.0102896	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	16.90	0.000506	0.0085514	0.0259	0.109	0.002823131	61	1.579917428	100	0.300494	0.47475571	1	2.52	0.192908825	79	0.0024	57.2	0.003
Selenium	0.50	0.000506	0.000253	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.23	0.000506	0.000115296	0.01	0.109	0.00109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	29.53	0.000506	0.014941168	0.0505	0.109	0.0055045	50	2.525	100	0.300494	0.75874735	1	2.52	0.309203579	1,600	0.0002	160	0.002
Vanadium	23.23	0.000506	0.011756067	0.001365	0.109	0.000148751	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	52.26	0.000506	0.026442114	0.029735	0.109	0.00324113	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 34. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
Antimony	0.65	0.000869	0.00056485	0.0018813	0.166	0.000312288	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	6.34	0.000869	0.005511943	0.0025	0.166	0.000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	81.00	0.000869	0.070389	0.0549	0.166	0.0091134	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	0.72	0.000869	0.000621335	0.00005	0.166	0.0000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.39	0.000869	0.00033891	0.0008803	0.166	0.000146125	73	0.06425973	100	0.516131	0.033166439	1	4.7	0.00715989	3.4	0.002	0.85	0.008
Cobalt	11.56	0.000869	0.010049364	0.0007656	0.166	0.000127094	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	12.73	0.000869	0.011061129	0.0044	0.166	0.0007304	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	1,127.43	0.000869	0.979735428	0.0944	0.166	0.0156704	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	16.90	0.000869	0.0146861	0.0259003	0.166	0.004299447	61	1.579917428	100	0.516131	0.815444362	1	4.7	0.17753828	79	0.002	57.2	0.003
Selenium	0.50	0.000869	0.0004345	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.23	0.000869	0.000198008	0.01	0.166	0.00166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	29.53	0.000869	0.025659832	0.0505	0.166	0.008383	50	2.525	100	0.516131	1.303230775	1	4.7	0.2845263	1,600	0.000	160	0.002
Vanadium	23.23	0.000869	0.020189767	0.0013647	0.166	0.000226538	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	52.26	0.000869	0.045411457	0.0297351	0.166	0.004936032	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 37. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
Antimony	0.65	0.00276	0.001794	0.0018813	0.064	0.0001204	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	6.34	0.00276	0.017506286	0.0025	0.064	0.00016	4.7	21	3	79	0.06444	0.21632508	1	1.14	0.20525558	22.8	0.01	5.7	0.04
Barium	81.00	0.00276	0.22356	0.0549	0.064	0.0035136	43	21	75	79	0.06444	4.3999632	1	1.14	4.05880421	416.5	0.01	208.3	0.02
Beryllium	0.72	0.00276	0.0019734	0.00005	0.064	0.0000032	0.52	21	3	79	0.06444	0.159759648	1	1.14	0.1418739	NS	N/A	NS	N/A
Cadmium	0.39	0.00276	0.0010764	0.0008803	0.064	5.63373E-05	8.5	21	3.8	79	0.06444	0.30847428	1	1.14	0.2715851	3.4	0.08	0.85	0.32
Cobalt	11.56	0.00276	0.031917429	0.0007656	0.064	0.000049	9.69	21	10.3	79	0.06444	0.655477236	1	1.14	0.60302076	43.9	0.01	23.1	0.03
Copper	12.73	0.00276	0.035130857	0.0044	0.064	0.0002816	15.5	21	30	79	0.06444	1.7369802	1	1.14	1.5547304	33.2	0.05	26.9	0.06
Manganese	1,127.43	0.00276	3.111702856	0.0944	0.064	0.0060416	1640	21	8820	79	0.06444	471.198168	1	1.14	416.06659	9770	0.04	977	0.43
Nickel	16.90	0.00276	0.046644	0.0259003	0.064	0.001657618	18	21	66	79	0.06444	3.6034848	1	1.14	3.20332142	79	0.04	57.2	0.06
Selenium	0.50	0.00276	0.00138	0.0005	0.064	0.000032	7.8	21	0.3	79	0.06444	0.120825	1	1.14	0.10722544	0.8	0.13	0.4	0.27
Silver	0.23	0.00276	0.000628886	0.01	0.064	0.00064	0.78	21	0.1	79	0.06444	0.015646032	1	1.14	0.01483765	39.7	0.00	3.97	0.00
Uranium	29.53	0.00276	0.08149728	0.0505	0.064	0.003232	20.8	21	121.03	79	0.06444	6.442829504	1	1.14	5.72592876	1,600	0.00	160	0.04
Vanadium	23.23	0.00276	0.064124	0.0013647	0.064	0.00008734	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	52.26	0.00276	0.144229714	0.0297351	0.064	0.001903049	132	21	163	79	0.06444	10.0842156	1	1.14	8.97398979	224	0.04	10.5	0.85

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 37. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.65	0.00469	0.0030485	0.001881	0.537	0.001010231	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	6.34	0.00469	0.029748	0.0025	0.537	0.0013425	3	61	4.7	39	0.13331	0.48831453	1	6.55	0.079298478	9.63	0.01	1.91	0.04
Barium	81.00	0.00469	0.37989	0.0549	0.537	0.0294813	75	61	43	39	0.13331	8.3345412	1	6.55	1.334948473	51	0.03	5.1	0.26
Beryllium	0.72	0.00469	0.00335335	0.00005	0.537	0.00002685	3	61	0.52	39	0.13331	0.270992568	1	6.55	0.041888972	6.2	0.01	0.62	0.07
Cadmium	0.39	0.00469	0.0018291	0.00088	0.537	0.000472705	3.8	61	8.5	39	0.13331	0.75093523	1	6.55	0.114998021	2.3	0.05	0.23	0.50
Cobalt	11.56	0.00469	0.0542365	0.000766	0.537	0.000411141	10.3	61	9.69	39	0.13331	1.341378551	1	6.55	0.21313377	20	0.01	5	0.04
Copper	12.73	0.00469	0.059697	0.0044	0.537	0.0023628	30	61	15.5	39	0.13331	3.24543195	1	6.55	0.504960573	35.4	0.01	24.3	0.02
Manganese	1,127.43	0.00469	5.287639998	0.0944	0.537	0.0506928	8820	61	1640	39	0.13331	802.499538	1	6.55	123.3340261	268	0.46	83	**1.49**
Nickel	16.90	0.00469	0.079261	0.0259	0.537	0.013908453	66	61	18	39	0.13331	6.3028968	1	6.55	0.976498665	42.1	0.02	23.1	0.04
Selenium	0.50	0.00469	0.002345	0.0005	0.537	0.0002685	0.3	61	7.8	39	0.13331	0.42992475	1	6.55	0.066036374	0.25	0.26	0.025	**2.64**
Silver	0.23	0.00469	0.00106865	0.01	0.537	0.00537	0.1	61	0.78	39	0.13331	0.048684812	1	6.55	0.008415796	2.7	0.00	0.27	0.03
Uranium	29.53	0.00469	0.13848632	0.0505	0.537	0.0271185	121.03	61	20.8	39	0.13331	10.92347538	1	6.55	1.692989343	5	0.34	0.5	**3.39**
Vanadium	23.23	0.00469	0.108964333	0.001365	0.537	0.000732837	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	52.26	0.00469	0.245086	0.029735	0.537	0.015967768	163	61	132	39	0.13331	20.1178121	1	6.55	3.111277232	225	0.01	22.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 39. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
Antimony	0.65	0.00369	0.0023985	0.001881	0.116	0.000218225	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	6.34	0.00369	0.023405143	0.0025	0.116	0.00029	3	100	0.36531	1.09593	1	1.191	0.940071489	9.63	0.10	1.91	0.49
Barium	81.00	0.00369	0.29889	0.0549	0.116	0.0063684	75	100	0.36531	27.39825	1	1.191	23.26071234	51	0.46	5.1	**4.56**
Beryllium	0.72	0.00369	0.00263835	0.00005	0.116	0.0000058	3	100	0.36531	1.09593	1	1.191	0.922396432	6.2	0.15	0.62	**1.49**
Cadmium	0.39	0.00369	0.0014391	0.00088	0.116	0.000102111	3.8	100	0.36531	1.388178	1	1.191	1.166850723	2.3	0.51	0.23	**5.07**
Cobalt	11.56	0.00369	0.042672214	0.000766	0.116	8.88125E-05	10.3	100	0.36531	3.762693	1	1.191	3.195175505	20	0.16	5	0.64
Copper	12.73	0.00369	0.046968429	0.0044	0.116	0.0005104	30	100	0.36531	10.9593	1	1.191	9.2416279	35.4	0.26	24.3	0.38
Manganese	1,127.43	0.00369	4.160211427	0.0944	0.116	0.0109504	8820	100	0.36531	3222.0342	1	1.191	2708.820623	268	**10.11**	83	**32.64**
Nickel	16.90	0.00369	0.062361	0.0259	0.116	0.003004433	66	100	0.36531	24.11046	1	1.191	20.29876191	42.1	0.48	23.1	0.88
Selenium	0.50	0.00369	0.001845	0.0005	0.116	0.000058	0.3	100	0.36531	0.109593	1	1.191	0.093615449	0.25	0.37	0.025	**3.74**
Silver	0.23	0.00369	0.000840793	0.01	0.116	0.00116	0.1	100	0.36531	0.036531	1	1.191	0.032352471	2.7	0.01	0.27	0.12
Uranium	29.53	0.00369	0.10895832	0.0505	0.116	0.005858	121.03	100	0.36531	44.213532	1	1.191	37.21943615	5	**7.44**	0.5	**74.44**
Vanadium	23.23	0.00369	0.085731	0.001365	0.116	0.000158304	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	52.26	0.00369	0.192828857	0.029735	0.116	0.003449276	163	100	0.36531	59.54553	1	1.191	50.16104797	225	0.22	22.5	**2.23**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PH 45. Hazard Quotient Calculations for a Piscivorous Mammal (Mink)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0004			0.127				100	0.2376		1	0.955					
Antimony	0.50	0.0004	0.0002	0.0005	0.127	0.0000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.62	N/A	0.062	N/A
Arsenic	3.63	0.0004	0.001453333	0.004353	0.127	0.000552768	ND	N/A	100	0.2376	N/A	1	0.955	N/A	9.63	N/A	1.91	N/A
Barium	55.88	0.0004	0.022351111	0.026656	0.127	0.003385344	ND	N/A	100	0.2376	N/A	1	0.955	N/A	51	N/A	5.1	N/A
Beryllium	1.79	0.0004	0.000716444	0.002906	0.127	0.000369094	ND	N/A	100	0.2376	N/A	1	0.955	N/A	6.2	N/A	0.62	N/A
Cadmium	0.55	0.0004	0.000219556	0.002929	0.127	0.000372035	73	0.213847059	100	0.2376	0.05081006	1	0.955	0.053823719	2.3	0.023	0.23	0.234
Cobalt	8.02	0.0004	0.003207556	0.0044	0.127	0.0005588	ND	N/A	100	0.2376	N/A	1	0.955	N/A	20	N/A	5	N/A
Copper	14.36	0.0004	0.005742222	0.047162	0.127	0.005989619	ND	N/A	100	0.2376	N/A	1	0.955	N/A	35.4	N/A	24.3	N/A
Manganese	1,147.22	0.0004	0.458888889	8.719	0.127	1.107313	ND	N/A	100	0.2376	N/A	1	0.955	N/A	268	N/A	83	N/A
Nickel	16.71	0.0004	0.006684444	0.242769	0.127	0.030831631	61	14.80889375	100	0.2376	3.51859316	1	0.955	3.723674587	42.1	0.088	23.1	0.161
Selenium	2.59	0.0004	0.001037333	0.001	0.127	0.000127	ND	N/A	100	0.2376	N/A	1	0.955	N/A	0.25	N/A	0.025	N/A
Silver	0.15	0.0004	5.91111E-05	0.005	0.127	0.000635	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.7	N/A	0.27	N/A
Uranium	139.80	0.0004	0.05592	0.1	0.127	0.0127	50	5	100	0.2376	1.188	1	0.955	1.315832461	5	0.263	0.5	**2.632**
Vanadium	10.33	0.0004	0.004133333	0.00025	0.127	0.00003175	ND	N/A	100	0.2376	N/A	1	0.955	N/A	2.1	N/A	0.21	N/A
Zinc	53.83	0.0004	0.021533333	0.298059	0.127	0.037853471	ND	N/A	100	0.2376	N/A	1	0.955	N/A	225	N/A	22.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PQ 32. Hazard Quotient Calculations for a Piscivorous Bird (Great Blue Heron)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000506			0.109				100	0.300494		1	2.52					
Antimony	0.50	0.000506	0.000253	0.0005	0.109	0.0000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Arsenic	3.63	0.000506	0.001838467	0.004353	0.109	0.000474423	ND	N/A	100	0.300494	N/A	1	2.52	N/A	22.8	N/A	5.7	N/A
Barium	55.88	0.000506	0.028274156	0.026656	0.109	0.002905531	ND	N/A	100	0.300494	N/A	1	2.52	N/A	416.5	N/A	208.3	N/A
Beryllium	1.79	0.000506	0.000906302	0.002906	0.109	0.000316781	ND	N/A	100	0.300494	N/A	1	2.52	N/A	NS	N/A	NS	N/A
Cadmium	0.55	0.000506	0.000277738	0.002929	0.109	0.000319306	73	0.213847059	100	0.300494	0.06425976	1	2.52	0.025736826	3.4	0.0076	0.85	0.030
Cobalt	8.02	0.000506	0.004057558	0.0044	0.109	0.0004796	ND	N/A	100	0.300494	N/A	1	2.52	N/A	43.9	N/A	23.1	N/A
Copper	14.36	0.000506	0.007263911	0.047162	0.109	0.005140696	ND	N/A	100	0.300494	N/A	1	2.52	N/A	33.2	N/A	26.9	N/A
Manganese	1,147.22	0.000506	0.580494444	8.719	0.109	0.950371	ND	N/A	100	0.300494	N/A	1	2.52	N/A	9,770	N/A	977	N/A
Nickel	16.71	0.000506	0.008455822	0.242769	0.109	0.026461794	61	14.80889375	100	0.300494	4.44998372	1	2.52	1.779722752	79	0.0225	57.2	0.031
Selenium	2.59	0.000506	0.001312227	0.001	0.109	0.000109	ND	N/A	100	0.300494	N/A	1	2.52	N/A	0.8	N/A	0.4	N/A
Silver	0.15	0.000506	7.47756E-05	0.005	0.109	0.000545	ND	N/A	100	0.300494	N/A	1	2.52	N/A	39.7	N/A	3.97	N/A
Uranium	139.80	0.000506	0.0707388	0.1	0.109	0.0109	50	5	100	0.300494	1.50247	1	2.52	0.628614603	1,600	0.0004	160	0.004
Vanadium	10.33	0.000506	0.005228667	0.00025	0.109	0.00002725	ND	N/A	100	0.300494	N/A	1	2.52	N/A	114	N/A	11.4	N/A
Zinc	53.83	0.000506	0.027239667	0.298059	0.109	0.032488412	ND	N/A	100	0.300494	N/A	1	2.52	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PR 32. Hazard Quotient Calculations for a Piscivorous Bird (Bald Eagle)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Fish)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Water to Fish BAF	Conc. in Fish (mg/kg d.w.)	Percent of Diet Fish	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000869			0.166				100	0.516131		1	4.7					
Antimony	0.50	0.000869	0.0004345	0.0005	0.166	0.000083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Arsenic	3.63	0.000869	0.003157367	0.0043525	0.166	0.000722515	ND	N/A	100	0.516131	N/A	1	4.7	N/A	22.8	N/A	5.7	N/A
Barium	55.88	0.000869	0.048557789	0.0266563	0.166	0.004424938	ND	N/A	100	0.516131	N/A	1	4.7	N/A	416.5	N/A	208.3	N/A
Beryllium	1.79	0.000869	0.001556476	0.0029063	0.166	0.000482438	ND	N/A	100	0.516131	N/A	1	4.7	N/A	NS	N/A	NS	N/A
Cadmium	0.55	0.000869	0.000476984	0.0029294	0.166	0.000486282	73	0.213847059	100	0.516131	0.110373096	1	4.7	0.02368859	3.4	0.007	0.85	0.028
Cobalt	8.02	0.000869	0.006968414	0.0044	0.166	0.0007304	ND	N/A	100	0.516131	N/A	1	4.7	N/A	43.9	N/A	23.1	N/A
Copper	14.36	0.000869	0.012474978	0.0471624	0.166	0.007828951	ND	N/A	100	0.516131	N/A	1	4.7	N/A	33.2	N/A	26.9	N/A
Manganese	1,147.22	0.000869	0.996936111	8.719	0.166	1.447354	ND	N/A	100	0.516131	N/A	1	4.7	N/A	9,770	N/A	977	N/A
Nickel	16.71	0.000869	0.014521956	0.2427688	0.166	0.040299613	61	14.80889375	100	0.516131	7.64332914	1	4.7	1.63790441	79	0.021	57.2	0.029
Selenium	2.59	0.000869	0.002253607	0.001	0.166	0.000166	ND	N/A	100	0.516131	N/A	1	4.7	N/A	0.8	N/A	0.4	N/A
Silver	0.15	0.000869	0.000128419	0.005	0.166	0.00083	ND	N/A	100	0.516131	N/A	1	4.7	N/A	39.7	N/A	3.97	N/A
Uranium	139.80	0.000869	0.1214862	0.1	0.166	0.0166	50	5	100	0.516131	2.580655	1	4.7	0.57845557	1,600	0.000	160	0.004
Vanadium	10.33	0.000869	0.008979667	0.00025	0.166	0.0000415	ND	N/A	100	0.516131	N/A	1	4.7	N/A	114	N/A	11.4	N/A
Zinc	53.83	0.000869	0.046781167	0.2980588	0.166	0.049477765	ND	N/A	100	0.516131	N/A	1	4.7	N/A	224	N/A	10.5	N/A

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
ND: Not defined; database insufficient to derive values
N/A: Value could not be calculated with the information available

TABLE PK 35. Hazard Quotient Calculations for an Omnivorous Bird (Mallard Duck)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00276			0.064			21		79	0.06444		1	1.14					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00276	0.00138	0.0005	0.064	0.000032	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	NS	N/A	NS	N/A
Arsenic	3.63	0.00276	0.010028	0.0043525	0.064	0.00027856	0.25	21	5	79	0.06444	0.2579211	1	1.14	0.23528742	22.8	0.01	5.7	0.04
Barium	55.88	0.00276	0.154222667	0.0266563	0.064	0.001706	2.2	21	74	79	0.06444	3.79693368	1	1.14	3.46742311	416.5	0.01	208.3	0.02
Beryllium	1.79	0.00276	0.004943467	0.0029063	0.064	0.000186	0.41	21	12.7	79	0.06444	0.652074804	1	1.14	0.57649497	NS	N/A	NS	N/A
Cadmium	0.55	0.00276	0.001514933	0.0029294	0.064	0.000187482	2	21	1.5	79	0.06444	0.1034262	1	1.14	0.09221808	3.4	0.03	0.85	0.11
Cobalt	8.02	0.00276	0.022132133	0.0044	0.064	0.0002816	0.46	21	27.8	79	0.06444	1.421456184	1	1.14	1.26655256	43.9	0.03	23.1	0.05
Copper	14.36	0.00276	0.039621333	0.0471624	0.064	0.003018391	37.2	21	73	79	0.06444	4.21966008	1	1.14	3.73885948	33.2	0.11	26.9	0.14
Manganese	1,147.22	0.00276	3.166333333	8.719	0.064	0.558016	688	21	17200	79	0.06444	884.9210112	1	1.14	779.513474	9770	0.08	977	0.80
Nickel	16.71	0.00276	0.046122667	0.2427688	0.064	0.0155372	5	21	71	79	0.06444	3.6821016	1	1.14	3.28400129	79	0.04	57.2	0.06
Selenium	2.59	0.00276	0.0071576	0.001	0.064	0.000064	0.6	21	0.3	79	0.06444	0.02339172	1	1.14	0.02685379	0.8	0.03	0.4	0.07
Silver	0.15	0.00276	0.000407867	0.005	0.064	0.00032	0.88	21	3.6	79	0.06444	0.195175872	1	1.14	0.17184538	39.7	0.00	3.97	0.04
Uranium	139.80	0.00276	0.385848	0.1	0.064	0.0064	35.9	21	1177.04835	79	0.06444	60.40651974	1	1.14	53.3322524	1,600	0.03	160	0.33
Vanadium	10.33	0.00276	0.02852	0.00025	0.064	0.000016	NM	21	NM	79	0.06444	N/A	1	1.14	N/A	114	N/A	11.4	N/A
Zinc	53.83	0.00276	0.14858	0.2980588	0.064	0.019075765	183	21	115	79	0.06444	8.3308032	1	1.14	7.45478857	224	0.03	10.5	0.71

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PG 35. Hazard Quotient Calculations for an Omnivorous Mammal (Raccoon)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Dietary Items (Aquatic Vegetation and Aquatic Invertebrates)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc.in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day d.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00469			0.537			61		39	0.13331		1	6.55					
Antimony	0.50	0.00469	0.002345	0.0005	0.537	0.0002685	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	0.62	N/A	0.062	N/A
Arsenic	3.63	0.00469	0.017040333	0.004353	0.537	0.002337293	5	61	0.25	39	0.13331	0.41959323	1	6.55	0.067018451	9.63	0.01	1.91	0.04
Barium	55.88	0.00469	0.262066778	0.026656	0.537	0.014314406	74	61	2.2	39	0.13331	6.13199338	1	6.55	0.978377796	51	0.02	5.1	0.19
Beryllium	1.79	0.00469	0.008400311	0.002906	0.537	0.001560656	12.7	61	0.41	39	0.13331	1.05406884	1	6.55	0.162447299	6.2	0.03	0.62	0.26
Cadmium	0.55	0.00469	0.002574289	0.002929	0.537	0.001573094	1.5	61	2	39	0.13331	0.22596045	1	6.55	0.035130967	2.3	0.02	0.23	0.15
Cobalt	8.02	0.00469	0.037608589	0.0044	0.537	0.0023628	27.8	61	0.46	39	0.13331	2.28458679	1	6.55	0.354894379	20	0.02	5	0.07
Copper	14.36	0.00469	0.067327556	0.047162	0.537	0.025326184	73	61	37.2	39	0.13331	7.87035578	1	6.55	1.215726644	35.4	0.03	24.3	0.05
Manganese	1,147.22	0.00469	5.380472221	8.719	0.537	4.682103	17200	61	688	39	0.13331	1434.45826	1	6.55	220.537532	268	0.82	83	**2.66**
Nickel	16.71	0.00469	0.078375111	0.242769	0.537	0.130366819	71	61	5	39	0.13331	6.0336106	1	6.55	0.953030921	42.1	0.02	23.1	0.04
Selenium	2.59	0.00469	0.012162733	0.001	0.537	0.000537	0.3	61	0.6	39	0.13331	0.05559027	1	6.55	0.010425955	0.25	0.04	0.025	0.42
Silver	0.15	0.00469	0.000693078	0.005	0.537	0.002685	3.6	61	0.88	39	0.13331	0.33850075	1	6.55	0.052195241	2.7	0.02	0.27	0.19
Uranium	139.80	0.00469	0.655662	0.1	0.537	0.0537	1177.04835	61	35.9	39	0.13331	97.5829858	1	6.55	15.00646531	5	**3.00**	0.5	**30.01**
Vanadium	10.33	0.00469	0.048463333	0.00025	0.537	0.00013425	NM	61	NM	39	0.13331	N/A	1	6.55	N/A	2.1	N/A	0.21	N/A
Zinc	53.83	0.00469	0.252478333	0.298059	0.537	0.160057588	115	61	183	39	0.13331	18.8660312	1	6.55	2.94329269	225	0.01	22.5	0.13

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PC 37. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Vegetation, Maximum Concentrations)
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116			100	0.36531		1	1.191					
Antimony	0.50	0.00369	0.001845	0.0005	0.116	0.000058	NM	100	0.36531	N/A	1	1.191	N/A	0.62	N/A	0.062	N/A
Arsenic	3.63	0.00369	0.013407	0.004353	0.116	0.00050489	5	100	0.36531	1.82655	1	1.191	1.545308052	9.63	0.16	1.91	0.81
Barium	55.88	0.00369	0.206189	0.026656	0.116	0.003092125	74	100	0.36531	27.03294	1	1.191	22.87340145	51	0.45	5.1	**4.48**
Beryllium	1.79	0.00369	0.0066092	0.002906	0.116	0.000337125	12.7	100	0.36531	4.639437	1	1.191	3.901245445	6.2	0.63	0.62	**6.29**
Cadmium	0.55	0.00369	0.0020254	0.002929	0.116	0.000339812	1.5	100	0.36531	0.547965	1	1.191	0.462074065	2.3	0.20	0.23	**2.01**
Cobalt	8.02	0.00369	0.0295897	0.0044	0.116	0.0005104	27.8	100	0.36531	10.155618	1	1.191	8.552240218	20	0.43	5	**1.71**
Copper	14.36	0.00369	0.052972	0.047162	0.116	0.005470833	73	100	0.36531	26.66763	1	1.191	22.44002757	35.4	0.63	24.3	0.92
Manganese	1,147.22	0.00369	4.233249999	8.719	0.116	1.011404	17200	100	0.36531	6283.332	1	1.191	5280.081154	268	**19.70**	83	**63.62**
Nickel	16.71	0.00369	0.061664	0.242769	0.116	0.028161175	71	100	0.36531	25.93701	1	1.191	21.85292626	42.1	0.52	23.1	0.95
Selenium	2.59	0.00369	0.0095694	0.001	0.116	0.000116	0.3	100	0.36531	0.109593	1	1.191	0.10014979	0.25	0.40	0.025	**4.01**
Silver	0.15	0.00369	0.0005453	0.005	0.116	0.00058	3.6	100	0.36531	1.315116	1	1.191	1.105156423	2.7	0.41	0.27	**4.09**
Uranium	139.80	0.00369	0.515862	0.1	0.116	0.0116	1177.05	100	0.36531	429.98753	1	1.191	361.4735472	5	**72.29**	0.5	**722.95**
Vanadium	10.33	0.00369	0.03813	0.00025	0.116	0.000029	NM	100	0.36531	N/A	1	1.191	N/A	2.1	N/A	0.21	N/A
Zinc	53.83	0.00369	0.198645	0.298059	0.116	0.034574824	115	100	0.36531	42.01065	1	1.191	35.46924418	225	0.16	22.5	**1.58**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 15. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.00827	0.009924	0.00025	0.0099	0.000002475	1	0.07	0.141806786	NS	N/A	NS	N/A
Arsenic	37.7	0.00827	0.311779	0.0007	0.0099	0.00000693	1	0.07	4.454084714	22.8	0.20	5.7	0.78
Beryllium	10.3	0.00827	0.085181	0.0032	0.0099	0.00003168	1	0.07	1.217324	NS	N/A	NS	N/A
Cadmium	4.3	0.00827	0.035561	0.053	0.0099	0.0005247	1	0.07	0.51551	3.4	0.15	0.85	0.61
Cobalt	114	0.00827	0.94278	0.06	0.0099	0.000594	1	0.07	13.47677143	43.9	0.31	23.1	0.58
Copper	68.5	0.00827	0.566495	0.08	0.0099	0.000792	1	0.07	8.1041	33.2	0.24	26.9	0.30
Manganese	3970	0.00827	32.8319	91.2	0.0099	0.90288	1	0.07	481.9254286	9770	0.05	977	0.49
Molybdenum	7.5	0.00827	0.062025	NM	0.0099	N/A	1	0.07	0.886071429	35.5	0.02	3.55	0.25
Nickel	281	0.00827	2.32387	1.38	0.0099	0.013662	1	0.07	33.39331429	79	0.42	57.2	0.58
Selenium	0.27	0.00827	0.0022329	0.0005	0.0099	0.00000495	1	0.07	0.031969286	0.8	0.04	0.4	0.08
Uranium	2271	0.00827	18.78117	0.727	0.0099	0.0071973	1	0.07	268.4052471	1,600	0.17	160	**1.68**
Vanadium	36.8	0.00827	0.304336	0.00051	0.0099	0.000005049	1	0.07	4.347729271	114	0.04	11.4	0.38
Zinc	866	0.00827	7.16182	3	0.0099	0.0297	1	0.07	102.736	224	0.46	10.5	**9.78**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 10. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Central Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.00184	0.002208	0.00025	0.057	0.00001425	1	0.541	0.004107671	0.62	0.01	0.062	0.07
Arsenic	37.7	0.00184	0.069368	0.0007	0.057	0.0000399	1	0.541	0.128295564	9.63	0.01	1.91	0.07
Beryllium	10.3	0.00184	0.018952	0.0032	0.057	0.0001824	1	0.541	0.035368577	6.2	0.01	0.62	0.06
Cadmium	4.3	0.00184	0.007912	0.053	0.057	0.003021	1	0.541	0.020208872	2.3	0.01	0.23	0.09
Cobalt	114	0.00184	0.20976	0.06	0.057	0.00342	1	0.541	0.394048059	20	0.02	5	0.08
Copper	68.5	0.00184	0.12604	0.08	0.057	0.00456	1	0.541	0.241404806	35.4	0.01	24.3	0.01
Manganese	3970	0.00184	7.3048	91.2	0.057	5.1984	1	0.541	23.11127542	268	0.09	83	0.28
Molybdenum	7.5	0.00184	0.0138	NM	0.057	N/A	1	0.541	0.025508318	1.9	0.01	0.19	0.13
Nickel	281	0.00184	0.51704	1.38	0.057	0.07866	1	0.541	1.101109057	42.1	0.03	23.1	0.05
Selenium	0.27	0.00184	0.0004968	0.0005	0.057	0.0000285	1	0.541	0.00097098	0.25	0.00	0.025	0.04
Uranium	2271	0.00184	4.17864	0.727	0.057	0.041439	1	0.541	7.800515712	5	**1.56**	0.5	**15.60**
Vanadium	36.8	0.00184	0.067712	0.00051	0.057	0.00002907	1	0.541	0.125214547	2.1	0.06	0.21	0.60
Zinc	866	0.00184	1.59344	3	0.057	0.171	1	0.541	3.261441774	225	0.01	22.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 19. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.78	0.00827	0.0064506	0.0086	0.0099	0.00008514	1	0.07	0.093367714	NS	N/A	NS	N/A
Arsenic	8.7	0.00827	0.071949	0.0019	0.0099	0.00001881	1	0.07	1.028111571	22.8	0.05	5.7	0.18
Beryllium	0.38	0.00827	0.0031426	0.00005	0.0099	0.000000495	1	0.07	0.044901357	NS	N/A	NS	N/A
Cadmium	0.13	0.00827	0.0010751	0.0018	0.0099	0.00001782	1	0.07	0.015613143	3.4	0.00	0.85	0.02
Cobalt	4.7	0.00827	0.038869	0.002	0.0099	0.0000198	1	0.07	0.555554286	43.9	0.01	23.1	0.02
Copper	9.4	0.00827	0.077738	0.0141	0.0099	0.00013959	1	0.07	1.112537	33.2	0.03	26.9	0.04
Manganese	414	0.00827	3.42378	0.0903	0.0099	0.00089397	1	0.07	48.92391386	9770	0.01	977	0.05
Molybdenum	0.21	0.00827	0.0017367	NM	0.0099	N/A	1	0.07	0.02481	35.5	0.00	3.55	0.01
Nickel	9.9	0.00827	0.081873	0.0083	0.0099	0.00008217	1	0.07	1.170788143	79	0.01	57.2	0.02
Selenium	0.26	0.00827	0.0021502	0.0005	0.0099	0.00000495	1	0.07	0.030787857	0.8	0.04	0.4	0.08
Uranium	8.65	0.00827	0.0715355	0.027	0.0099	0.0002673	1	0.07	1.025754286	1,600	0.00	160	0.01
Vanadium	16.3	0.00827	0.134801	0.0048	0.0099	0.00004752	1	0.07	1.926407429	114	0.02	11.4	0.17
Zinc	41.7	0.00827	0.344859	0.0522	0.0099	0.00051678	1	0.07	4.933939714	224	0.02	10.5	0.47

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 14. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.78	0.00184	0.0014352	0.0086	0.057	0.0004902	1	0.541	0.003558965	0.62	0.01	0.062	0.06
Arsenic	8.7	0.00184	0.016008	0.0019	0.057	0.0001083	1	0.541	0.029789834	9.63	0.00	1.91	0.02
Beryllium	0.38	0.00184	0.0006992	0.00005	0.057	0.00000285	1	0.541	0.001297689	6.2	0.00	0.62	0.00
Cadmium	0.13	0.00184	0.0002392	0.0018	0.057	0.0001026	1	0.541	0.000631793	2.3	0.00	0.23	0.00
Cobalt	4.7	0.00184	0.008648	0.002	0.057	0.000114	1	0.541	0.016195933	20	0.00	5	0.00
Copper	9.4	0.00184	0.017296	0.0141	0.057	0.0008037	1	0.541	0.033456007	35.4	0.00	24.3	0.00
Manganese	414	0.00184	0.76176	0.0903	0.057	0.0051471	1	0.541	1.417573198	268	0.01	83	0.02
Molybdenum	0.21	0.00184	0.0003864	NM	0.057	N/A	1	0.541	0.000714233	1.9	0.00	0.19	0.00
Nickel	9.9	0.00184	0.018216	0.0083	0.057	0.0004731	1	0.541	0.034545471	42.1	0.00	23.1	0.00
Selenium	0.26	0.00184	0.0004784	0.0005	0.057	0.0000285	1	0.541	0.000936969	0.25	0.00	0.025	0.04
Uranium	8.65	0.00184	0.015916	0.027	0.057	0.001539	1	0.541	0.032264325	5	0.01	0.5	0.06
Vanadium	16.3	0.00184	0.029992	0.0048	0.057	0.0002736	1	0.541	0.055943808	2.1	0.03	0.21	0.27
Zinc	41.7	0.00184	0.076728	0.0522	0.057	0.0029754	1	0.541	0.147326063	225	0.00	22.5	0.01

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
N/A:	Value could not be calculated with the information available

TABLE PN 17. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.7	0.00827	0.005789	0.0022	0.0099	0.00002178	1	0.07	0.083011143	NS	N/A	NS	N/A
Arsenic	18.9	0.00827	0.156303	0.002	0.0099	0.0000198	1	0.07	2.233182857	22.8	0.10	5.7	0.39
Beryllium	3.4	0.00827	0.028118	0.00005	0.0099	0.000000495	1	0.07	0.401692786	NS	N/A	NS	N/A
Cadmium	10.8	0.00827	0.089316	0.0026	0.0099	0.00002574	1	0.07	1.276310571	3.4	0.38	0.85	**1.50**
Cobalt	29.5	0.00827	0.243965	0.0014	0.0099	0.00001386	1	0.07	3.485412286	43.9	0.08	23.1	0.15
Copper	27.2	0.00827	0.224944	0.047	0.0099	0.0004653	1	0.07	3.220132857	33.2	0.10	26.9	0.12
Manganese	17100	0.00827	141.417	4.74	0.0099	0.046926	1	0.07	2020.913229	9770	0.21	977	**2.07**
Molybdenum	9	0.00827	0.07443	NM	0.0099	N/A	1	0.07	1.063285714	35.5	0.03	3.55	0.30
Nickel	237	0.00827	1.95999	0.11	0.0099	0.001089	1	0.07	28.01541429	79	0.35	57.2	0.49
Selenium	0.59	0.00827	0.0048793	0.0005	0.0099	0.00000495	1	0.07	0.069775	0.8	0.09	0.4	0.17
Uranium	126	0.00827	1.04202	0.078	0.0099	0.0007722	1	0.07	14.89703143	1,600	0.01	160	0.09
Vanadium	36.3	0.00827	0.300201	0.00058	0.0099	0.000005742	1	0.07	4.288667743	114	0.04	11.4	0.38
Zinc	305	0.00827	2.52235	0.1	0.0099	0.00099	1	0.07	36.04771429	224	0.16	10.5	**3.43**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 12. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Lower Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.7	0.00184	0.001288	0.0022	0.057	0.0001254	1	0.541	0.002612569	0.62	0.00	0.062	0.04
Arsenic	18.9	0.00184	0.034776	0.002	0.057	0.000114	1	0.541	0.064491682	9.63	0.01	1.91	0.03
Beryllium	3.4	0.00184	0.006256	0.00005	0.057	0.00000285	1	0.541	0.011569039	6.2	0.00	0.62	0.02
Cadmium	10.8	0.00184	0.019872	0.0026	0.057	0.0001482	1	0.541	0.037005915	2.3	0.02	0.23	0.16
Cobalt	29.5	0.00184	0.05428	0.0014	0.057	0.0000798	1	0.541	0.100480222	20	0.01	5	0.02
Copper	27.2	0.00184	0.050048	0.047	0.057	0.002679	1	0.541	0.097462107	35.4	0.00	24.3	0.00
Manganese	17100	0.00184	31.464	4.74	0.057	0.27018	1	0.541	58.65837338	268	0.22	83	0.71
Molybdenum	9	0.00184	0.01656	NM	0.057	N/A	1	0.541	0.030609982	1.9	0.02	0.19	0.16
Nickel	237	0.00184	0.43608	0.11	0.057	0.00627	1	0.541	0.817652495	42.1	0.02	23.1	0.04
Selenium	0.59	0.00184	0.0010856	0.0005	0.057	0.0000285	1	0.541	0.002059335	0.25	0.01	0.025	0.08
Uranium	126	0.00184	0.23184	0.078	0.057	0.004446	1	0.541	0.436757856	5	0.09	0.5	0.87
Vanadium	36.3	0.00184	0.066792	0.00058	0.057	0.00003306	1	0.541	0.123521368	2.1	0.06	0.21	0.59
Zinc	305	0.00184	0.5612	0.1	0.057	0.0057	1	0.541	1.047874307	225	0.00	22.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 18. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.64	0.00827	0.0052928	0.0073	0.0099	0.00007227	1	0.07	0.076643857	NS	N/A	NS	N/A
Arsenic	5.2	0.00827	0.043004	0.0018	0.0099	0.00001782	1	0.07	0.614597429	22.8	0.03	5.7	0.11
Beryllium	1.4	0.00827	0.011578	0.00005	0.0099	0.000000495	1	0.07	0.165407071	NS	N/A	NS	N/A
Cadmium	1.2	0.00827	0.009924	0.0024	0.0099	0.00002376	1	0.07	0.142110857	3.4	0.04	0.85	0.17
Cobalt	17.9	0.00827	0.148033	0.00025	0.0099	0.000002475	1	0.07	2.1147925	43.9	0.05	23.1	0.09
Copper	12.7	0.00827	0.105029	0.04	0.0099	0.000396	1	0.07	1.506071429	33.2	0.05	26.9	0.06
Manganese	3780	0.00827	31.2606	1.07	0.0099	0.010593	1	0.07	446.7313286	9770	0.05	977	0.46
Molybdenum	1.4	0.00827	0.011578	NM	0.0099	N/A	1	0.07	0.1654	35.5	0.00	3.55	0.05
Nickel	53	0.00827	0.43831	0.02	0.0099	0.000198	1	0.07	6.2644	79	0.08	57.2	0.11
Selenium	0.32	0.00827	0.0026464	0.0046	0.0099	0.00004554	1	0.07	0.038456286	0.8	0.05	0.4	0.10
Uranium	45	0.00827	0.37215	0.1	0.0099	0.00099	1	0.07	5.330571429	1,600	0.00	160	0.03
Vanadium	21.5	0.00827	0.177805	0.0049	0.0099	0.00004851	1	0.07	2.540764429	114	0.02	11.4	0.22
Zinc	105	0.00827	0.86835	0.07	0.0099	0.000693	1	0.07	12.4149	224	0.06	10.5	**1.18**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 13. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Middle Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00184			0.057		1	0.541					
Antimony	0.64	0.00184	0.0011776	0.0073	0.057	0.0004161	1	0.541	0.002945841	0.62	0.00	0.062	0.05
Arsenic	5.2	0.00184	0.009568	0.0018	0.057	0.0001026	1	0.541	0.017875416	9.63	0.00	1.91	0.01
Beryllium	1.4	0.00184	0.002576	0.00005	0.057	0.00000285	1	0.541	0.004766821	6.2	0.00	0.62	0.01
Cadmium	1.2	0.00184	0.002208	0.0024	0.057	0.0001368	1	0.541	0.004334196	2.3	0.00	0.23	0.02
Cobalt	17.9	0.00184	0.032936	0.00025	0.057	0.00001425	1	0.541	0.060906192	20	0.00	5	0.01
Copper	12.7	0.00184	0.023368	0.04	0.057	0.00228	1	0.541	0.047408503	35.4	0.00	24.3	0.00
Manganese	3780	0.00184	6.9552	1.07	0.057	0.06099	1	0.541	12.96892791	268	0.05	83	0.16
Molybdenum	1.4	0.00184	0.002576	NM	0.057	N/A	1	0.541	0.004761553	1.9	0.00	0.19	0.03
Nickel	53	0.00184	0.09752	0.02	0.057	0.00114	1	0.541	0.182365989	42.1	0.00	23.1	0.01
Selenium	0.32	0.00184	0.0005888	0.0046	0.057	0.0002622	1	0.541	0.001573013	0.25	0.01	0.025	0.06
Uranium	45	0.00184	0.0828	0.1	0.057	0.0057	1	0.541	0.163585952	5	0.03	0.5	0.33
Vanadium	21.5	0.00184	0.03956	0.0049	0.057	0.0002793	1	0.541	0.073640111	2.1	0.04	0.21	0.35
Zinc	105	0.00184	0.1932	0.07	0.057	0.00399	1	0.541	0.364491682	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 16. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.69	0.00827	0.0057063	0.0048	0.0099	0.00004752	1	0.07	0.082197429	NS	N/A	NS	N/A
Arsenic	9.9	0.00827	0.081873	0.0093	0.0099	0.00009207	1	0.07	1.170929571	22.8	0.05	5.7	0.21
Beryllium	1.3	0.00827	0.010751	0.00005	0.0099	0.000000495	1	0.07	0.153592786	NS	N/A	NS	N/A
Cadmium	0.5	0.00827	0.004135	0.0044	0.0099	0.00004356	1	0.07	0.059693714	3.4	0.02	0.85	0.07
Cobalt	12.2	0.00827	0.100894	0.0024	0.0099	0.00002376	1	0.07	1.441682286	43.9	0.03	23.1	0.06
Copper	22.1	0.00827	0.182767	0.051	0.0099	0.0005049	1	0.07	2.61817	33.2	0.08	26.9	0.10
Manganese	1090	0.00827	9.0143	15.9	0.0099	0.15741	1	0.07	131.0244286	9770	0.01	977	0.13
Molybdenum	3.3	0.00827	0.027291	NM	0.0099	N/A	1	0.07	0.389871429	35.5	0.01	3.55	0.11
Nickel	24.3	0.00827	0.200961	0.32	0.0099	0.003168	1	0.07	2.916128571	79	0.04	57.2	0.05
Selenium	0.15	0.00827	0.0012405	0.0005	0.0099	0.00000495	1	0.07	0.017792143	0.8	0.02	0.4	0.04
Uranium	35.4	0.00827	0.292758	0.13	0.0099	0.001287	1	0.07	4.200642857	1,600	0.00	160	0.03
Vanadium	30.4	0.00827	0.251408	0.0082	0.0099	0.00008118	1	0.07	3.592702571	114	0.03	11.4	0.32
Zinc	65.6	0.00827	0.542512	0.38	0.0099	0.003762	1	0.07	7.803914286	224	0.03	10.5	0.74

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 11. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Upper Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.69	0.00184	0.0012696	0.0048	0.057	0.0002736	1	0.541	0.002852495	0.62	0.00	0.062	0.05
Arsenic	9.9	0.00184	0.018216	0.0093	0.057	0.0005301	1	0.541	0.034650832	9.63	0.00	1.91	0.02
Beryllium	1.3	0.00184	0.002392	0.00005	0.057	0.00000285	1	0.541	0.00442671	6.2	0.00	0.62	0.01
Cadmium	0.5	0.00184	0.00092	0.0044	0.057	0.0002508	1	0.541	0.00216414	2.3	0.00	0.23	0.01
Cobalt	12.2	0.00184	0.022448	0.0024	0.057	0.0001368	1	0.541	0.041746396	20	0.00	5	0.01
Copper	22.1	0.00184	0.040664	0.051	0.057	0.002907	1	0.541	0.080537893	35.4	0.00	24.3	0.00
Manganese	1090	0.00184	2.0056	15.9	0.057	0.9063	1	0.541	5.382439926	268	0.02	83	0.06
Molybdenum	3.3	0.00184	0.006072	NM	0.057	N/A	1	0.541	0.01122366	1.9	0.01	0.19	0.06
Nickel	24.3	0.00184	0.044712	0.32	0.057	0.01824	1	0.541	0.116362292	42.1	0.00	23.1	0.01
Selenium	0.15	0.00184	0.000276	0.0005	0.057	0.0000285	1	0.541	0.000562847	0.25	0.00	0.025	0.02
Uranium	35.4	0.00184	0.065136	0.13	0.057	0.00741	1	0.541	0.134096118	5	0.03	0.5	0.27
Vanadium	30.4	0.00184	0.055936	0.0082	0.057	0.0004674	1	0.541	0.104257671	2.1	0.05	0.21	0.50
Zinc	65.6	0.00184	0.120704	0.38	0.057	0.02166	1	0.541	0.263149723	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 14. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.1	0.00827	0.009097	0.0005	0.0099	0.00000495	1	0.07	0.130027857	NS	N/A	NS	N/A
Arsenic	9	0.00827	0.07443	0.003	0.0099	0.0000297	1	0.07	1.06371	22.8	0.05	5.7	0.19
Beryllium	1.2	0.00827	0.009924	0.0043	0.0099	0.00004257	1	0.07	0.142379571	NS	N/A	NS	N/A
Cadmium	0.51	0.00827	0.0042177	0.005	0.0099	0.0000495	1	0.07	0.06096	3.4	0.02	0.85	0.07
Cobalt	17.5	0.00827	0.144725	0.0019	0.0099	0.00001881	1	0.07	2.067768714	43.9	0.05	23.1	0.09
Copper	14.9	0.00827	0.123223	0.06	0.0099	0.000594	1	0.07	1.768814286	33.2	0.05	26.9	0.07
Manganese	2500	0.00827	20.675	15.9	0.0099	0.15741	1	0.07	297.6058571	9770	0.03	977	0.30
Molybdenum	3.4	0.00827	0.028118	NM	0.0099	N/A	1	0.07	0.401685714	35.5	0.01	3.55	0.11
Nickel	20.1	0.00827	0.166227	0.4	0.0099	0.00396	1	0.07	2.431242857	79	0.03	57.2	0.04
Selenium	2.7	0.00827	0.022329	0.001	0.0099	0.0000099	1	0.07	0.319127143	0.8	0.40	0.4	0.80
Uranium	113	0.00827	0.93451	0.103	0.0099	0.0010197	1	0.07	13.36471	1,600	0.01	160	0.08
Vanadium	48.5	0.00827	0.401095	0.00025	0.0099	0.000002475	1	0.07	5.729963929	114	0.05	11.4	0.50
Zinc	50.1	0.00827	0.414327	0.5	0.0099	0.00495	1	0.07	5.989671429	224	0.03	10.5	0.57

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 9. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00184			0.057		1	0.541					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.1	0.00184	0.002024	0.0005	0.057	0.0000285	1	0.541	0.0037939	0.62	0.01	0.062	0.06
Arsenic	9	0.00184	0.01656	0.003	0.057	0.000171	1	0.541	0.030926063	9.63	0.00	1.91	0.02
Beryllium	1.2	0.00184	0.002208	0.0043	0.057	0.0002451	1	0.541	0.004534381	6.2	0.00	0.62	0.01
Cadmium	0.51	0.00184	0.0009384	0.005	0.057	0.000285	1	0.541	0.002261368	2.3	0.00	0.23	0.01
Cobalt	17.5	0.00184	0.0322	0.0019	0.057	0.0001083	1	0.541	0.059719593	20	0.00	5	0.01
Copper	14.9	0.00184	0.027416	0.06	0.057	0.00342	1	0.541	0.056998152	35.4	0.00	24.3	0.00
Manganese	2500	0.00184	4.6	15.9	0.057	0.9063	1	0.541	10.1780037	268	0.04	83	0.12
Molybdenum	3.4	0.00184	0.006256	NM	0.057	N/A	1	0.541	0.011563771	1.9	0.01	0.19	0.06
Nickel	20.1	0.00184	0.036984	0.4	0.057	0.0228	1	0.541	0.11050647	42.1	0.00	23.1	0.00
Selenium	2.7	0.00184	0.004968	0.001	0.057	0.000057	1	0.541	0.009288355	0.25	0.04	0.025	0.37
Uranium	113	0.00184	0.20792	0.103	0.057	0.005871	1	0.541	0.395177449	5	0.08	0.5	0.79
Vanadium	48.5	0.00184	0.08924	0.00025	0.057	0.00001425	1	0.541	0.164980129	2.1	0.08	0.21	0.79
Zinc	50.1	0.00184	0.092184	0.5	0.057	0.0285	1	0.541	0.223075786	225	0.00	22.5	0.01

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
N/A:	Value could not be calculated with the information available

TABLE PN 40. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Invertebrates, Maximum Concentrations)
AOI: Central Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099			100	0.02353		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.2	0.00827	0.009924	0.00025	0.0099	0.000002475	NM	100	0.02353	N/A	1	0.07	N/A	NS	N/A	NS	N/A
Arsenic	37.7	0.00827	0.311779	0.0007	0.0099	0.00000693	0.25	100	0.02353	0.0058825	1	0.07	4.538120429	22.8	0.20	5.7	0.80
Beryllium	10.3	0.00827	0.085181	0.0032	0.0099	0.00003168	0.41	100	0.02353	0.0096473	1	0.07	1.355142571	NS	N/A	NS	N/A
Cadmium	4.3	0.00827	0.035561	0.053	0.0099	0.0005247	2	100	0.02353	0.04706	1	0.07	1.187795714	3.4	0.35	0.85	**1.40**
Cobalt	114	0.00827	0.94278	0.06	0.0099	0.000594	0.46	100	0.02353	0.0108238	1	0.07	13.63139714	43.9	0.31	23.1	0.59
Copper	68.5	0.00827	0.566495	0.08	0.0099	0.000792	37.2	100	0.02353	0.875316	1	0.07	20.60861429	33.2	0.62	26.9	0.77
Manganese	3970	0.00827	32.8319	91.2	0.0099	0.90288	688	100	0.02353	16.18864	1	0.07	713.1917143	9770	0.07	977	0.73
Molybdenum	7.5	0.00827	0.062025	NM	0.0099	N/A	NM	100	0.02353	N/A	1	0.07	N/A	35.5	N/A	3.55	N/A
Nickel	281	0.00827	2.32387	1.38	0.0099	0.013662	5	100	0.02353	0.11765	1	0.07	35.07402857	79	0.44	57.2	0.61
Selenium	0.27	0.00827	0.0022329	0.0005	0.0099	0.00000495	0.6	100	0.02353	0.014118	1	0.07	0.233655	0.8	0.29	0.4	0.58
Uranium	2271	0.00827	18.78117	0.727	0.0099	0.0071973	35.9	100	0.02353	0.844727	1	0.07	280.4727757	1,600	0.18	160	**1.75**
Vanadium	36.8	0.00827	0.304336	0.00051	0.0099	0.000005049	NM	100	0.02353	N/A	1	0.07	N/A	114	N/A	11.4	N/A
Zinc	866	0.00827	7.16182	3	0.0099	0.0297	183	100	0.02353	4.30599	1	0.07	164.2501429	224	0.73	10.5	**15.64**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 44. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Invertebrates, Maximum Concentrations)
AOI: Lower Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00827			0.0099			100	0.02353		1	0.07					
Antimony	0.78	0.00827	0.0064506	0.0086	0.0099	0.00008514	NM	100	0.02353	N/A	1	0.07	N/A	NS	N/A	NS	N/A
Arsenic	8.7	0.00827	0.071949	0.0019	0.0099	0.00001881	2	100	0.02353	0.04706	1	0.07	1.700397286	22.8	0.07	5.7	0.30
Beryllium	0.38	0.00827	0.0031426	0.00005	0.0099	0.000000495	0.85	100	0.02353	0.0200005	1	0.07	0.330622786	NS	N/A	NS	N/A
Cadmium	0.13	0.00827	0.0010751	0.0018	0.0099	0.00001782	2.3	100	0.02353	0.054119	1	0.07	0.788741714	3.4	0.23	0.85	0.93
Cobalt	4.7	0.00827	0.038869	0.002	0.0099	0.0000198	2.3	100	0.02353	0.054119	1	0.07	1.328682857	43.9	0.03	23.1	0.06
Copper	9.4	0.00827	0.077738	0.0141	0.0099	0.00013959	20	100	0.02353	0.4706	1	0.07	7.835394143	33.2	0.24	26.9	0.29
Manganese	414	0.00827	3.42378	0.0903	0.0099	0.00089397	4120	100	0.02353	96.9436	1	0.07	1433.832485	9770	0.15	977	**1.47**
Molybdenum	0.21	0.00827	0.0017367	NM	0.0099	N/A	NM	100	0.02353	N/A	1	0.07	N/A	35.5	N/A	3.55	N/A
Nickel	9.9	0.00827	0.081873	0.0083	0.0099	0.00008217	19	100	0.02353	0.44707	1	0.07	7.557502429	79	0.10	57.2	0.13
Selenium	0.26	0.00827	0.0021502	0.0005	0.0099	0.00000495	0.4	100	0.02353	0.009412	1	0.07	0.165245	0.8	0.21	0.4	0.41
Uranium	8.65	0.00827	0.0715355	0.027	0.0099	0.0002673	30.8	100	0.02353	0.724724	1	0.07	11.37895429	1,600	0.01	160	0.07
Vanadium	16.3	0.00827	0.134801	0.0048	0.0099	0.00004752	NM	100	0.02353	N/A	1	0.07	N/A	114	N/A	11.4	N/A
Zinc	41.7	0.00827	0.344859	0.0522	0.0099	0.00051678	170	100	0.02353	4.0001	1	0.07	62.07822543	224	0.28	10.5	**5.91**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 42. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Invertebrates, Maximum Concentrations)
AOI: Lower Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00827			0.0099			100	0.02353		1	0.07					
Antimony	0.7	0.00827	0.005789	0.0022	0.0099	0.00002178	NM	100	0.02353	N/A	1	0.07	N/A	NS	N/A	NS	N/A
Arsenic	18.9	0.00827	0.156303	0.002	0.0099	0.0000198	4.7	100	0.02353	0.110591	1	0.07	3.813054286	22.8	0.17	5.7	0.67
Beryllium	3.4	0.00827	0.028118	0.00005	0.0099	0.000000495	0.52	100	0.02353	0.0122356	1	0.07	0.576487071	NS	N/A	NS	N/A
Cadmium	10.8	0.00827	0.089316	0.0026	0.0099	0.00002574	8.5	100	0.02353	0.200005	1	0.07	4.133524857	3.4	**1.22**	0.85	**4.86**
Cobalt	29.5	0.00827	0.243965	0.0014	0.0099	0.00001386	9.69	100	0.02353	0.2280057	1	0.07	6.742636571	43.9	0.15	23.1	0.29
Copper	27.2	0.00827	0.224944	0.047	0.0099	0.0004653	15.5	100	0.02353	0.364715	1	0.07	8.430347143	33.2	0.25	26.9	0.31
Manganese	17100	0.00827	141.417	4.74	0.0099	0.046926	1640	100	0.02353	38.5892	1	0.07	2572.187514	9770	0.26	977	**2.63**
Molybdenum	9	0.00827	0.07443	NM	0.0099	N/A	NM	100	0.02353	N/A	1	0.07	N/A	35.5	N/A	3.55	N/A
Nickel	237	0.00827	1.95999	0.11	0.0099	0.001089	18	100	0.02353	0.42354	1	0.07	34.06598571	79	0.43	57.2	0.60
Selenium	0.59	0.00827	0.0048793	0.0005	0.0099	0.00000495	7.8	100	0.02353	0.183534	1	0.07	2.691689286	0.8	**3.36**	0.4	**6.73**
Uranium	126	0.00827	1.04202	0.078	0.0099	0.0007722	20.8	100	0.02353	0.489424	1	0.07	21.88880286	1,600	0.01	160	0.14
Vanadium	36.3	0.00827	0.300201	0.00058	0.0099	0.000005742	NM	100	0.02353	N/A	1	0.07	N/A	114	N/A	11.4	N/A
Zinc	305	0.00827	2.52235	0.1	0.0099	0.00099	132	100	0.02353	3.10596	1	0.07	80.41857143	224	0.36	10.5	**7.66**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 43. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Invertebrates, Maximum Concentrations)
AOI: Middle Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099			100	0.02353		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.64	0.00827	0.0052928	0.0073	0.0099	0.00007227	NM	100	0.02353	N/A	1	0.07	N/A	NS	N/A	NS	N/A
Arsenic	5.2	0.00827	0.043004	0.0018	0.0099	0.00001782	2	100	0.02353	0.04706	1	0.07	1.286883143	22.8	0.06	5.7	0.23
Beryllium	1.4	0.00827	0.011578	0.00005	0.0099	0.000000495	0.85	100	0.02353	0.0200005	1	0.07	0.4511285	NS	N/A	NS	N/A
Cadmium	1.2	0.00827	0.009924	0.0024	0.0099	0.00002376	2.3	100	0.02353	0.054119	1	0.07	0.915239429	3.4	0.27	0.85	**1.08**
Cobalt	17.9	0.00827	0.148033	0.00025	0.0099	0.000002475	2.3	100	0.02353	0.054119	1	0.07	2.887921071	43.9	0.07	23.1	0.13
Copper	12.7	0.00827	0.105029	0.04	0.0099	0.000396	20	100	0.02353	0.4706	1	0.07	8.228928571	33.2	0.25	26.9	0.31
Manganese	3780	0.00827	31.2606	1.07	0.0099	0.010593	4120	100	0.02353	96.9436	1	0.07	1831.6399	9770	0.19	977	**1.87**
Molybdenum	1.4	0.00827	0.011578	NM	0.0099	N/A	NM	100	0.02353	N/A	1	0.07	N/A	35.5	N/A	3.55	N/A
Nickel	53	0.00827	0.43831	0.02	0.0099	0.000198	19	100	0.02353	0.44707	1	0.07	12.65111429	79	0.16	57.2	0.22
Selenium	0.32	0.00827	0.0026464	0.0046	0.0099	0.00004554	0.4	100	0.02353	0.009412	1	0.07	0.172913429	0.8	0.22	0.4	0.43
Uranium	45	0.00827	0.37215	0.1	0.0099	0.00099	30.8	100	0.02353	0.724724	1	0.07	15.68377143	1,600	0.01	160	0.10
Vanadium	21.5	0.00827	0.177805	0.0049	0.0099	0.00004851	NM	100	0.02353	N/A	1	0.07	N/A	114	N/A	11.4	N/A
Zinc	105	0.00827	0.86835	0.07	0.0099	0.000693	170	100	0.02353	4.0001	1	0.07	69.55918571	224	0.31	10.5	**6.62**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 41. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Invertebrates, Maximum Concentrations)
AOI: Upper Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099			100	0.02353		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.69	0.00827	0.0057063	0.0048	0.0099	0.00004752	NM	100	0.02353	N/A	1	0.07	N/A	NS	N/A	NS	N/A
Arsenic	9.9	0.00827	0.081873	0.0093	0.0099	0.00009207	4.7	100	0.02353	0.110591	1	0.07	2.750801	22.8	0.12	5.7	0.48
Beryllium	1.3	0.00827	0.010751	0.00005	0.0099	0.000000495	0.52	100	0.02353	0.0122356	1	0.07	0.328387071	NS	N/A	NS	N/A
Cadmium	0.5	0.00827	0.004135	0.0044	0.0099	0.00004356	8.5	100	0.02353	0.200005	1	0.07	2.916908	3.4	0.86	0.85	**3.43**
Cobalt	12.2	0.00827	0.100894	0.0024	0.0099	0.00002376	9.69	100	0.02353	0.2280057	1	0.07	4.698906571	43.9	0.11	23.1	0.20
Copper	22.1	0.00827	0.182767	0.051	0.0099	0.0005049	15.5	100	0.02353	0.364715	1	0.07	7.828384286	33.2	0.24	26.9	0.29
Manganese	1090	0.00827	9.0143	15.9	0.0099	0.15741	1640	100	0.02353	38.5892	1	0.07	682.2987143	9770	0.07	977	0.70
Molybdenum	3.3	0.00827	0.027291	NM	0.0099	N/A	NM	100	0.02353	N/A	1	0.07	N/A	35.5	N/A	3.55	N/A
Nickel	24.3	0.00827	0.200961	0.32	0.0099	0.003168	18	100	0.02353	0.42354	1	0.07	8.9667	79	0.11	57.2	0.16
Selenium	0.15	0.00827	0.0012405	0.0005	0.0099	0.00000495	7.8	100	0.02353	0.183534	1	0.07	2.639706429	0.8	**3.30**	0.4	**6.60**
Uranium	35.4	0.00827	0.292758	0.13	0.0099	0.001287	20.8	100	0.02353	0.489424	1	0.07	11.19241429	1,600	0.01	160	0.07
Vanadium	30.4	0.00827	0.251408	0.0082	0.0099	0.00008118	NM	100	0.02353	N/A	1	0.07	N/A	114	N/A	11.4	N/A
Zinc	65.6	0.00827	0.542512	0.38	0.0099	0.003762	132	100	0.02353	3.10596	1	0.07	52.17477143	224	0.23	10.5	**4.97**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 39. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Aquatic Invertebrates, Maximum Concentrations)
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00827			0.0099			100	0.02353		1	0.07					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	1.1	0.00827	0.009097	0.0005	0.0099	0.00000495	NM	100	0.02353	N/A	1	0.07	N/A	NS	N/A	NS	N/A
Arsenic	9	0.00827	0.07443	0.003	0.0099	0.0000297	0.25	100	0.02353	0.0058825	1	0.07	1.147745714	22.8	0.05	5.7	0.20
Beryllium	1.2	0.00827	0.009924	0.0043	0.0099	0.00004257	0.41	100	0.02353	0.0096473	1	0.07	0.280198143	NS	N/A	NS	N/A
Cadmium	0.51	0.00827	0.0042177	0.005	0.0099	0.0000495	2	100	0.02353	0.04706	1	0.07	0.733245714	3.4	0.22	0.85	0.86
Cobalt	17.5	0.00827	0.144725	0.0019	0.0099	0.00001881	0.46	100	0.02353	0.0108238	1	0.07	2.222394429	43.9	0.05	23.1	0.10
Copper	14.9	0.00827	0.123223	0.06	0.0099	0.000594	37.2	100	0.02353	0.875316	1	0.07	14.27332857	33.2	0.43	26.9	0.53
Manganese	2500	0.00827	20.675	15.9	0.0099	0.15741	688	100	0.02353	16.18864	1	0.07	528.8721429	9770	0.05	977	0.54
Molybdenum	3.4	0.00827	0.028118	NM	0.0099	N/A	NM	100	0.02353	N/A	1	0.07	N/A	35.5	N/A	3.55	N/A
Nickel	20.1	0.00827	0.166227	0.4	0.0099	0.00396	5	100	0.02353	0.11765	1	0.07	4.111957143	79	0.05	57.2	0.07
Selenium	2.7	0.00827	0.022329	0.001	0.0099	0.0000099	0.6	100	0.02353	0.014118	1	0.07	0.520812857	0.8	0.65	0.4	**1.30**
Uranium	113	0.00827	0.93451	0.103	0.0099	0.0010197	35.9	100	0.02353	0.844727	1	0.07	25.43223857	1,600	0.02	160	0.16
Vanadium	48.5	0.00827	0.401095	0.00025	0.0099	0.000002475	NM	100	0.02353	N/A	1	0.07	N/A	114	N/A	11.4	N/A
Zinc	50.1	0.00827	0.414327	0.5	0.0099	0.00495	183	100	0.02353	4.30599	1	0.07	67.50381429	224	0.30	10.5	**6.43**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
inverts:	Invertebrates
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PN 46. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Invertebrates)
AOI: Central Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00496			0.0131			100	0.02684		1	0.1064					
Antimony	0.557	0.00496	0.00276272	0.00025	0.0131	0.000003275	NM	100	0.02684	N/A	1	0.1064	N/A	NS	N/A	NS	N/A
Arsenic	20.806	0.00496	0.10319776	0.002742	0.0131	3.59186E-05	0.25	100	0.02684	0.00671	1	0.1064	1.03330525	22.8	0.05	5.7	0.18
Beryllium	3.8208	0.00496	0.018951168	0.00225	0.0131	0.000029475	0.41	100	0.02684	0.0110044	1	0.1064	0.281814314	NS	N/A	NS	N/A
Cadmium	2.342	0.00496	0.01161632	0.039712	0.0131	0.000520224	2	100	0.02684	0.05368	1	0.1064	0.618576542	3.4	0.18	0.85	0.73
Cobalt	55.048	0.00496	0.27303808	0.051567	0.0131	0.000675523	0.46	100	0.02684	0.0123464	1	0.1064	2.688533866	43.9	0.06	23.1	0.12
Copper	36.02	0.00496	0.1786592	0.050829	0.0131	0.000665865	37.2	100	0.02684	0.998448	1	0.1064	11.06929573	33.2	0.33	26.9	0.41
Manganese	2176.72	0.00496	10.7965312	71.524	0.0131	0.9369644	688	100	0.02684	18.46592	1	0.1064	283.829094	9770	0.03	977	0.29
Molybdenum	4.09	0.00496	0.0202864	NM	0.0131	N/A	NM	100	0.02684	N/A	1	0.1064	N/A	35.5	N/A	3.55	N/A
Nickel	112.5	0.00496	0.558	1.103	0.0131	0.0144493	5	100	0.02684	0.1342	1	0.1064	6.641440789	79	0.08	57.2	0.12
Selenium	0.135	0.00496	0.0006696	0.0005	0.0131	0.00000655	0.6	100	0.02684	0.016104	1	0.1064	0.157708177	0.8	0.20	0.4	0.39
Uranium	1084	0.00496	5.37664	0.366	0.0131	0.0047946	35.9	100	0.02684	0.963556	1	0.1064	59.6333703	1,600	0.04	160	0.37
Vanadium	22.474	0.00496	0.11147104	0.002003	0.0131	2.62437E-05	NM	100	0.02684	N/A	1	0.1064	N/A	114	N/A	11.4	N/A
Zinc	325.84	0.00496	1.6161664	1.16	0.0131	0.015196	183	100	0.02684	4.91172	1	0.1064	61.49513534	224	0.28	10.5	**5.86**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 50. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Invertebrates)
AOI: Lower Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131			100	0.02684		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.78	0.00496	0.0038688	0.002817	0.0131	3.68983E-05	NM	100	0.02684	N/A	1	0.1064	N/A	NS	N/A	NS	N/A
Arsenic	8.7	0.00496	0.043152	0.002128	0.0131	2.78739E-05	2	100	0.02684	0.05368	1	0.1064	0.910337161	22.8	0.04	5.7	0.16
Beryllium	0.38	0.00496	0.0018848	0.00005	0.0131	0.000000655	0.85	100	0.02684	0.022814	1	0.1064	0.232137735	NS	N/A	NS	N/A
Cadmium	0.13	0.00496	0.0006448	0.00085	0.0131	0.000011135	2.3	100	0.02684	0.061732	1	0.1064	0.586352773	3.4	0.17	0.85	0.69
Cobalt	4.7	0.00496	0.023312	0.000662	0.0131	8.67511E-06	2.3	100	0.02684	0.061732	1	0.1064	0.799367247	43.9	0.02	23.1	0.03
Copper	9.4	0.00496	0.046624	0.005144	0.0131	6.73922E-05	20	100	0.02684	0.5368	1	0.1064	5.483941656	33.2	0.17	26.9	0.20
Manganese	414	0.00496	2.05344	0.062622	0.0131	0.000820351	4120	100	0.02684	110.5808	1	0.1064	1058.600191	9770	0.11	977	**1.08**
Molybdenum	0.21	0.00496	0.0010416	NM	0.0131	N/A	NM	100	0.02684	N/A	1	0.1064	N/A	35.5	N/A	3.55	N/A
Nickel	9.9	0.00496	0.049104	0.003728	0.0131	4.88339E-05	19	100	0.02684	0.50996	1	0.1064	5.254819867	79	0.07	57.2	0.09
Selenium	0.26	0.00496	0.0012896	0.0005	0.0131	0.00000655	0.4	100	0.02684	0.010736	1	0.1064	0.113084117	0.8	0.14	0.4	0.28
Uranium	8.65	0.00496	0.042904	0.015325	0.0131	0.000200758	30.8	100	0.02684	0.826672	1	0.1064	8.174593586	1,600	0.01	160	0.05
Vanadium	16.3	0.00496	0.080848	0.002061	0.0131	2.70006E-05	NM	100	0.02684	N/A	1	0.1064	N/A	114	N/A	11.4	N/A
Zinc	41.7	0.00496	0.206832	0.022944	0.0131	0.000300572	170	100	0.02684	4.5628	1	0.1064	44.83019335	224	0.20	10.5	**4.27**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 48. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Invertebrates)
AOI: Lower Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00496			0.0131			100	0.02684		1	0.1064					
Antimony	0.7	0.00496	0.003472	0.001792	0.0131	2.34708E-05	NM	100	0.02684	N/A	1	0.1064	N/A	NS	N/A	NS	N/A
Arsenic	13.9	0.00496	0.068944	0.002313	0.0131	3.03047E-05	4.7	100	0.02684	0.126148	1	0.1064	1.833856247	22.8	0.08	5.7	0.32
Beryllium	2.85	0.00496	0.014136	0.00005	0.0131	0.000000655	0.52	100	0.02684	0.0139568	1	0.1064	0.264036231	NS	N/A	NS	N/A
Cadmium	7.3	0.00496	0.036208	0.001338	0.0131	1.75294E-05	8.5	100	0.02684	0.22814	1	0.1064	2.484638435	3.4	0.73	0.85	**2.92**
Cobalt	25.65	0.00496	0.127224	0.00065	0.0131	0.000008515	9.69	100	0.02684	0.2600796	1	0.1064	3.640151457	43.9	0.08	23.1	0.16
Copper	24.8	0.00496	0.123008	0.010444	0.0131	0.000136813	15.5	100	0.02684	0.41602	1	0.1064	5.067338469	33.2	0.15	26.9	0.19
Manganese	12300	0.00496	61.008	1.846	0.0131	0.0241826	1640	100	0.02684	44.0176	1	0.1064	987.3099868	9770	0.10	977	**1.01**
Molybdenum	6.55	0.00496	0.032488	NM	0.0131	N/A	NM	100	0.02684	N/A	1	0.1064	N/A	35.5	N/A	3.55	N/A
Nickel	183	0.00496	0.90768	0.047067	0.0131	0.000616573	18	100	0.02684	0.48312	1	0.1064	13.07722343	79	0.17	57.2	0.23
Selenium	0.4075	0.00496	0.0020212	0.0005	0.0131	0.00000655	7.8	100	0.02684	0.209352	1	0.1064	1.986651786	0.8	**2.48**	0.4	**4.97**
Uranium	126	0.00496	0.62496	0.04926	0.0131	0.000645306	20.8	100	0.02684	0.558272	1	0.1064	11.12666641	1,600	0.01	160	0.07
Vanadium	30.65	0.00496	0.152024	0.00043	0.0131	0.000005633	NM	100	0.02684	N/A	1	0.1064	N/A	114	N/A	11.4	N/A
Zinc	243	0.00496	1.20528	0.047844	0.0131	0.000626753	132	100	0.02684	3.54288	1	0.1064	44.63145445	224	0.20	10.5	**4.25**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 49. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Invertebrates)
AOI: Middle Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00496			0.0131			100	0.02684		1	0.1064					
Antimony	0.508	0.00496	0.00251968	0.003233	0.0131	4.23567E-05	NM	100	0.02684	N/A	1	0.1064	N/A	NS	N/A	NS	N/A
Arsenic	3.220	0.00496	0.0159712	0.002216	0.0131	2.90286E-05	2	100	0.02684	0.05368	1	0.1064	0.654889367	22.8	0.03	5.7	0.11
Beryllium	0.818	0.00496	0.00405852	0.00005	0.0131	0.000000655	0.85	100	0.02684	0.022814	1	0.1064	0.252567434	NS	N/A	NS	N/A
Cadmium	0.726	0.00496	0.0036022	0.000752	0.0131	9.85662E-06	2.3	100	0.02684	0.061732	1	0.1064	0.61413587	3.4	0.18	0.85	0.72
Cobalt	8.898	0.00496	0.0441316	0.00025	0.0131	0.000003275	2.3	100	0.02684	0.061732	1	0.1064	0.994989427	43.9	0.02	23.1	0.04
Copper	7.850	0.00496	0.038936	0.005	0.0131	0.0000655	20	100	0.02684	0.5368	1	0.1064	5.411668233	33.2	0.16	26.9	0.20
Manganese	1838.563	0.00496	9.11927	0.169	0.0131	0.0022139	4120	100	0.02684	110.5808	1	0.1064	1125.021465	9770	0.12	977	**1.15**
Molybdenum	0.843	0.00496	0.0041788	NM	0.0131	N/A	NM	100	0.02684	N/A	1	0.1064	N/A	35.5	N/A	3.55	N/A
Nickel	29.238	0.00496	0.145018	0.008706	0.0131	0.000114043	19	100	0.02684	0.50996	1	0.1064	6.156880101	79	0.08	57.2	0.11
Selenium	0.175	0.00496	0.000868	0.0046	0.0131	0.00006026	0.4	100	0.02684	0.010736	1	0.1064	0.109626504	0.8	0.14	0.4	0.27
Uranium	39.160	0.00496	0.1942336	0.02	0.0131	0.000262	30.8	100	0.02684	0.826672	1	0.1064	9.59743985	1,600	0.01	160	0.06
Vanadium	15.196	0.00496	0.0753734	0.001767	0.0131	2.31433E-05	NM	100	0.02684	N/A	1	0.1064	N/A	114	N/A	11.4	N/A
Zinc	65.175	0.00496	0.323268	0.017	0.0131	0.0002227	170	100	0.02684	4.5628	1	0.1064	45.92378477	224	0.21	10.5	**4.37**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 47. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Invertebrates)
AOI: Upper Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00496			0.0131			100	0.02684		1	0.1064					
Antimony	0.50	0.00496	0.0024738	0.001881	0.0131	2.46444E-05	NM	100	0.02684	N/A	1	0.1064	N/A	NS	N/A	NS	N/A
Arsenic	7.35	0.00496	0.036456	0.0025	0.0131	0.00003275	4.7	100	0.02684	0.126148	1	0.1064	1.528540883	22.8	0.07	5.7	0.27
Beryllium	1.07	0.00496	0.0053072	0.00005	0.0131	0.000000655	0.52	100	0.02684	0.0139568	1	0.1064	0.181058788	NS	N/A	NS	N/A
Cadmium	0.33	0.00496	0.0016244	0.00088	0.0131	1.15315E-05	8.5	100	0.02684	0.22814	1	0.1064	2.159548229	3.4	0.64	0.85	**2.54**
Cobalt	8.68	0.00496	0.043028	0.000766	0.0131	1.00297E-05	9.69	100	0.02684	0.2600796	1	0.1064	2.848849903	43.9	0.06	23.1	0.12
Copper	16.98	0.00496	0.084196	0.0044	0.0131	0.00005764	15.5	100	0.02684	0.41602	1	0.1064	4.701819925	33.2	0.14	26.9	0.17
Manganese	632.00	0.00496	3.13472	0.0944	0.0131	0.00123664	1640	100	0.02684	44.0176	1	0.1064	443.1725248	9770	0.05	977	0.45
Molybdenum	1.74	0.00496	0.0086118	NM	0.0131	N/A	NM	100	0.02684	N/A	1	0.1064	N/A	35.5	N/A	3.55	N/A
Nickel	17.18	0.00496	0.085188	0.0259	0.0131	0.000339294	18	100	0.02684	0.48312	1	0.1064	5.344429452	79	0.07	57.2	0.09
Selenium	0.20	0.00496	0.0009858	0.0005	0.0131	0.00000655	7.8	100	0.02684	0.209352	1	0.1064	1.976920583	0.8	**2.47**	0.4	**4.94**
Uranium	24.88	0.00496	0.12338	0.0505	0.0131	0.00066155	20.8	100	0.02684	0.558272	1	0.1064	6.412721335	1,600	0.00	160	0.04
Vanadium	25.55	0.00496	0.126728	0.001365	0.0131	1.78774E-05	NM	100	0.02684	N/A	1	0.1064	N/A	114	N/A	11.4	N/A
Zinc	54.85	0.00496	0.272056	0.029735	0.0131	0.00038953	132	100	0.02684	3.54288	1	0.1064	35.85832265	224	0.16	10.5	**3.42**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 45. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 4: Representative Life History Parameters, Central Tendency Metals Concentrations, One Dietary Item (Aquatic Invertebrates)
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w.)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00496			0.0131			100	0.02684		1	0.1064					
Antimony	0.470	0.00496	0.0023312	0.0005	0.0131	0.00000655	NM	100	0.02684	N/A	1	0.1064	N/A	NS	N/A	NS	N/A
Arsenic	4.655	0.00496	0.0230888	0.004353	0.0131	5.70178E-05	0.25	100	0.02684	0.00671	1	0.1064	0.280599791	22.8	0.01	5.7	0.05
Beryllium	0.675	0.00496	0.00334924	0.002906	0.0131	3.80719E-05	0.41	100	0.02684	0.0110044	1	0.1064	0.13526045	NS	N/A	NS	N/A
Cadmium	0.198	0.00496	0.0009796	0.002929	0.0131	3.83753E-05	2	100	0.02684	0.05368	1	0.1064	0.514078715	3.4	0.15	0.85	0.60
Cobalt	7.403	0.00496	0.0367164	0.0044	0.0131	0.00005764	0.46	100	0.02684	0.0123464	1	0.1064	0.461658271	43.9	0.01	23.1	0.02
Copper	9.888	0.00496	0.049042	0.047162	0.0131	0.000617827	37.2	100	0.02684	0.998448	1	0.1064	9.85063747	33.2	0.30	26.9	0.37
Manganese	890.425	0.00496	4.416508	8.719	0.0131	0.1142189	688	100	0.02684	18.46592	1	0.1064	216.1338994	9770	0.02	977	0.22
Molybdenum	1.618	0.00496	0.0080228	NM	0.0131	N/A	NM			N/A	1	0.1064	N/A	35.5	N/A	3.55	N/A
Nickel	9.831	0.00496	0.048763	0.242769	0.0131	0.003180271	5	100	0.02684	0.1342	1	0.1064	1.749466829	79	0.02	57.2	0.03
Selenium	0.443	0.00496	0.0021948	0.001	0.0131	0.0000131	0.6	100	0.02684	0.016104	1	0.1064	0.172104323	0.8	0.22	0.4	0.43
Uranium	78.950	0.00496	0.391592	0.1	0.0131	0.00131	35.9	100	0.02684	0.963556	1	0.1064	12.74866541	1,600	0.01	160	0.08
Vanadium	19.378	0.00496	0.0961124	0.00025	0.0131	0.000003275	NM	100	0.02684	N/A	1	0.1064	N/A	114	N/A	11.4	N/A
Zinc	30.950	0.00496	0.153512	0.298059	0.0131	0.003904571	183	100	0.02684	4.91172	1	0.1064	47.642261	224	0.21	10.5	**4.54**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PN 34. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.557	0.00496	0.00276272	0.00025	0.0131	0.000003275	1	0.1064	0.025996194	NS	N/A	NS	N/A
Arsenic	20.806	0.00496	0.10319776	0.002742	0.0131	3.59186E-05	1	0.1064	0.97024134	22.8	0.04	5.7	0.17
Beryllium	3.8208	0.00496	0.018951168	0.00225	0.0131	0.000029475	1	0.1064	0.178389502	NS	N/A	NS	N/A
Cadmium	2.342	0.00496	0.01161632	0.039712	0.0131	0.000520224	1	0.1064	0.114065264	3.4	0.03	0.85	0.13
Cobalt	55.048	0.00496	0.27303808	0.051567	0.0131	0.000675523	1	0.1064	2.572496272	43.9	0.06	23.1	0.11
Copper	36.02	0.00496	0.1786592	0.050829	0.0131	0.000665865	1	0.1064	1.685385952	33.2	0.05	26.9	0.06
Manganese	2176.72	0.00496	10.7965312	71.524	0.0131	0.9369644	1	0.1064	110.2772143	9770	0.01	977	0.11
Molybdenum	4.09	0.00496	0.0202864	NM	0.0131	N/A	1	0.1064	0.190661654	35.5	0.01	3.55	0.05
Nickel	112.5	0.00496	0.558	1.103	0.0131	0.0144493	1	0.1064	5.380162594	79	0.07	57.2	0.09
Selenium	0.135	0.00496	0.0006696	0.0005	0.0131	0.00000655	1	0.1064	0.006354793	0.8	0.01	0.4	0.02
Uranium	1084	0.00496	5.37664	0.366	0.0131	0.0047946	1	0.1064	50.57739286	1,600	0.03	160	0.32
Vanadium	22.474	0.00496	0.11147104	0.002003	0.0131	2.62437E-05	1	0.1064	1.047906801	114	0.01	11.4	0.09
Zinc	325.84	0.00496	1.6161664	1.16	0.0131	0.015196	1	0.1064	15.33235338	224	0.07	10.5	**1.46**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 24. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Central Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00369			0.116		1	1.191					
Antimony	0.557	0.00369	0.00205533	0.00025	0.116	0.000029	1	1.191	0.001750067	0.62	0.00	0.062	0.03
Arsenic	20.806	0.00369	0.07677414	0.002742	0.116	0.000318058	1	1.191	0.064728965	9.63	0.01	1.91	0.03
Beryllium	3.8208	0.00369	0.014098752	0.00225	0.116	0.000261	1	1.191	0.012056887	6.2	0.00	0.62	0.02
Cadmium	2.342	0.00369	0.00864198	0.039712	0.116	0.004606565	1	1.191	0.011123883	2.3	0.00	0.23	0.05
Cobalt	55.048	0.00369	0.20312712	0.051567	0.116	0.005981733	1	1.191	0.175574184	20	0.01	5	0.04
Copper	36.02	0.00369	0.1329138	0.050829	0.116	0.005896212	1	1.191	0.116549128	35.4	0.00	24.3	0.00
Manganese	2176.72	0.00369	8.0320968	71.524	0.116	8.296784	1	1.191	13.71022737	268	0.05	83	0.17
Molybdenum	4.09	0.00369	0.0150921	NM	0.116	N/A	1	1.191	0.012671788	1.9	0.01	0.19	0.07
Nickel	112.5	0.00369	0.415125	1.103	0.116	0.127948	1	1.191	0.455980688	42.1	0.01	23.1	0.02
Selenium	0.135	0.00369	0.00049815	0.0005	0.116	0.000058	1	1.191	0.000466961	0.25	0.00	0.025	0.02
Uranium	1084	0.00369	3.99996	0.366	0.116	0.042456	1	1.191	3.39413602	5	0.68	0.5	**6.79**
Vanadium	22.474	0.00369	0.08292906	0.002003	0.116	0.000232387	1	1.191	0.069824892	2.1	0.03	0.21	0.33
Zinc	325.84	0.00369	1.2023496	1.16	0.116	0.13456	1	1.191	1.12251016	225	0.00	22.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 38. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.78	0.00496	0.0038688	0.002817	0.0131	3.68983E-05	1	0.1064	0.036707691	NS	N/A	NS	N/A
Arsenic	8.7	0.00496	0.043152	0.002128	0.0131	2.78739E-05	1	0.1064	0.405825882	22.8	0.02	5.7	0.07
Beryllium	0.38	0.00496	0.0018848	0.00005	0.0131	0.000000655	1	0.1064	0.017720442	NS	N/A	NS	N/A
Cadmium	0.13	0.00496	0.0006448	0.00085	0.0131	0.000011135	1	0.1064	0.006164803	3.4	0.00	0.85	0.01
Cobalt	4.7	0.00496	0.023312	0.000662	0.0131	8.67511E-06	1	0.1064	0.219179277	43.9	0.00	23.1	0.01
Copper	9.4	0.00496	0.046624	0.005144	0.0131	6.73922E-05	1	0.1064	0.438828874	33.2	0.01	26.9	0.02
Manganese	414	0.00496	2.05344	0.062622	0.0131	0.000820351	1	0.1064	19.30695819	9770	0.00	977	0.02
Molybdenum	0.21	0.00496	0.0010416	NM	0.0131	N/A	1	0.1064	0.009789474	35.5	0.00	3.55	0.00
Nickel	9.9	0.00496	0.049104	0.003728	0.0131	4.88339E-05	1	0.1064	0.461962725	79	0.01	57.2	0.01
Selenium	0.26	0.00496	0.0012896	0.0005	0.0131	0.00000655	1	0.1064	0.012181861	0.8	0.02	0.4	0.03
Uranium	8.65	0.00496	0.042904	0.015325	0.0131	0.000200758	1	0.1064	0.405119901	1,600	0.00	160	0.00
Vanadium	16.3	0.00496	0.080848	0.002061	0.0131	2.70006E-05	1	0.1064	0.760103389	114	0.01	11.4	0.07
Zinc	41.7	0.00496	0.206832	0.022944	0.0131	0.000300572	1	0.1064	1.946734701	223.5	0.01	10.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 28. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.78	0.00369	0.0028782	0.002817	0.116	0.000326733	1	1.191	0.00269096	0.62	0.00	0.062	0.04
Arsenic	8.7	0.00369	0.032103	0.002128	0.116	0.000246822	1	1.191	0.027161899	9.63	0.00	1.91	0.01
Beryllium	0.38	0.00369	0.0014022	0.00005	0.116	0.0000058	1	1.191	0.0011822	6.2	0.00	0.62	0.00
Cadmium	0.13	0.00369	0.0004797	0.00085	0.116	0.0000986	1	1.191	0.000485558	2.3	0.00	0.23	0.00
Cobalt	4.7	0.00369	0.017343	0.000662	0.116	7.68178E-05	1	1.191	0.014626211	20	0.00	5	0.00
Copper	9.4	0.00369	0.034686	0.005144	0.116	0.000596756	1	1.191	0.02962448	35.4	0.00	24.3	0.00
Manganese	414	0.00369	1.52766	0.062622	0.116	0.007264178	1	1.191	1.288769251	268	0.00	83	0.02
Molybdenum	0.21	0.00369	0.0007749	NM	0.116	N/A	1	1.191	0.00065063	1.9	0.00	0.19	0.00
Nickel	9.9	0.00369	0.036531	0.003728	0.116	0.000432422	1	1.191	0.031035619	42.1	0.00	23.1	0.00
Selenium	0.26	0.00369	0.0009594	0.0005	0.116	0.000058	1	1.191	0.00085424	0.25	0.00	0.025	0.03
Uranium	8.65	0.00369	0.0319185	0.015325	0.116	0.0017777	1	1.191	0.028292359	5	0.01	0.5	0.06
Vanadium	16.3	0.00369	0.060147	0.002061	0.116	0.000239089	1	1.191	0.050702006	2.1	0.02	0.21	0.24
Zinc	41.7	0.00369	0.153873	0.022944	0.116	0.002661556	1	1.191	0.131431197	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 36. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.7	0.00496	0.003472	0.001792	0.0131	2.34708E-05	1	0.1064	0.032852169	NS	N/A	NS	N/A
Arsenic	13.9	0.00496	0.068944	0.002313	0.0131	3.03047E-05	1	0.1064	0.648254743	22.8	0.03	5.7	0.11
Beryllium	2.85	0.00496	0.014136	0.00005	0.0131	0.000000655	1	0.1064	0.132863299	NS	N/A	NS	N/A
Cadmium	7.3	0.00496	0.036208	0.001338	0.0131	1.75294E-05	1	0.1064	0.340465502	3.4	0.10	0.85	0.40
Cobalt	25.65	0.00496	0.127224	0.00065	0.0131	0.000008515	1	0.1064	1.195794314	43.9	0.03	23.1	0.05
Copper	24.8	0.00496	0.123008	0.010444	0.0131	0.000136813	1	0.1064	1.157376063	33.2	0.03	26.9	0.04
Manganese	12300	0.00496	61.008	1.846	0.0131	0.0241826	1	0.1064	573.6107387	9770	0.06	977	0.59
Molybdenum	6.55	0.00496	0.032488	NM	0.0131	N/A	1	0.1064	0.305338346	35.5	0.01	3.55	0.09
Nickel	183	0.00496	0.90768	0.047067	0.0131	0.000616573	1	0.1064	8.53662193	79	0.11	57.2	0.15
Selenium	0.4075	0.00496	0.0020212	0.0005	0.0131	0.00000655	1	0.1064	0.019057801	0.8	0.02	0.4	0.05
Uranium	126	0.00496	0.62496	0.04926	0.0131	0.000645306	1	0.1064	5.879749117	1,600	0.00	160	0.04
Vanadium	30.65	0.00496	0.152024	0.00043	0.0131	0.000005633	1	0.1064	1.428849934	114	0.01	11.4	0.13
Zinc	243	0.00496	1.20528	0.047844	0.0131	0.000626753	1	0.1064	11.33371009	224	0.05	10.5	**1.08**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 26. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Lower Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.7	0.00369	0.002583	0.001792	0.116	0.000207833	1	1.191	0.002343269	0.62	0.00	0.062	0.04
Arsenic	13.9	0.00369	0.051291	0.002313	0.116	0.000268347	1	1.191	0.043290803	9.63	0.00	1.91	0.02
Beryllium	2.85	0.00369	0.0105165	0.00005	0.116	0.0000058	1	1.191	0.008834845	6.2	0.00	0.62	0.01
Cadmium	7.3	0.00369	0.026937	0.001338	0.116	0.000155223	1	1.191	0.022747458	2.3	0.01	0.23	0.10
Cobalt	25.65	0.00369	0.0946485	0.00065	0.116	0.0000754	1	1.191	0.079533081	20	0.00	5	0.02
Copper	24.8	0.00369	0.091512	0.010444	0.116	0.001211475	1	1.191	0.077853463	35.4	0.00	24.3	0.00
Manganese	12300	0.00369	45.387	1.846	0.116	0.214136	1	1.191	38.28810747	268	0.14	83	0.46
Molybdenum	6.55	0.00369	0.0241695	NM	0.116	N/A	1	1.191	0.020293451	1.9	0.01	0.19	0.11
Nickel	183	0.00369	0.67527	0.047067	0.116	0.005459733	1	1.191	0.571561489	42.1	0.01	23.1	0.02
Selenium	0.4075	0.00369	0.001503675	0.0005	0.116	0.000058	1	1.191	0.00131123	0.25	0.01	0.025	0.05
Uranium	126	0.00369	0.46494	0.04926	0.116	0.00571416	1	1.191	0.395175617	5	0.08	0.5	0.79
Vanadium	30.65	0.00369	0.1130985	0.00043	0.116	0.00004988	1	1.191	0.095002838	2.1	0.05	0.21	0.45
Zinc	243	0.00369	0.89667	0.047844	0.116	0.005549875	1	1.191	0.757531381	225	0.00	22.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 37. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.508	0.00496	0.00251968	0.003233	0.0131	4.23567E-05	1	0.1064	0.024079292	NS	N/A	NS	N/A
Arsenic	3.220	0.00496	0.0159712	0.002216	0.0131	2.90286E-05	1	0.1064	0.150378089	22.8	0.01	5.7	0.03
Beryllium	0.818	0.00496	0.00405852	0.00005	0.0131	0.000000655	1	0.1064	0.038150141	NS	N/A	NS	N/A
Cadmium	0.726	0.00496	0.0036022	0.000752	0.0131	9.85662E-06	1	0.1064	0.033947901	3.4	0.01	0.85	0.04
Cobalt	8.898	0.00496	0.0441316	0.00025	0.0131	0.000003275	1	0.1064	0.414801457	43.9	0.01	23.1	0.02
Copper	7.850	0.00496	0.038936	0.005	0.0131	0.0000655	1	0.1064	0.366555451	33.2	0.01	26.9	0.01
Manganese	1838.563	0.00496	9.11927	0.169	0.0131	0.0022139	1	0.1064	85.72823214	9770	0.01	977	0.09
Molybdenum	0.843	0.00496	0.0041788	NM	0.0131	N/A	1	0.1064	0.039274436	35.5	0.00	3.55	0.01
Nickel	29.238	0.00496	0.145018	0.008706	0.0131	0.000114043	1	0.1064	1.364022958	79	0.02	57.2	0.02
Selenium	0.175	0.00496	0.000868	0.0046	0.0131	0.00006026	1	0.1064	0.008724248	0.8	0.01	0.4	0.02
Uranium	39.160	0.00496	0.1942336	0.02	0.0131	0.000262	1	0.1064	1.827966165	1,600	0.00	160	0.01
Vanadium	15.196	0.00496	0.0753734	0.001767	0.0131	2.31433E-05	1	0.1064	0.708614129	114	0.01	11.4	0.06
Zinc	65.175	0.00496	0.323268	0.017	0.0131	0.0002227	1	0.1064	3.040326128	224	0.01	10.5	0.29

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 27. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Middle Blue Creek, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.508	0.00369	0.00187452	0.003233	0.116	0.000375067	1	1.191	0.001888822	0.62	0.00	0.062	0.03
Arsenic	3.220	0.00369	0.0118818	0.002216	0.116	0.000257047	1	1.191	0.010192147	9.63	0.00	1.91	0.01
Beryllium	0.818	0.00369	0.003019343	0.00005	0.116	0.0000058	1	1.191	0.002540002	6.2	0.00	0.62	0.00
Cadmium	0.726	0.00369	0.002679863	0.000752	0.116	8.728E-05	1	1.191	0.002323377	2.3	0.00	0.23	0.01
Cobalt	8.898	0.00369	0.032831775	0.00025	0.116	0.000029	1	1.191	0.027590911	20	0.00	5	0.01
Copper	7.850	0.00369	0.0289665	0.005	0.116	0.00058	1	1.191	0.024808144	35.4	0.00	24.3	0.00
Manganese	1838.563	0.00369	6.784295625	0.169	0.116	0.019604	1	1.191	5.71276207	268	0.02	83	0.07
Molybdenum	0.843	0.00369	0.003108825	NM	0.116	N/A	1	1.191	0.002610264	1.9	0.00	0.19	0.01
Nickel	29.238	0.00369	0.107886375	0.008706	0.116	0.001009844	1	1.191	0.091432594	42.1	0.00	23.1	0.00
Selenium	0.175	0.00369	0.00064575	0.0046	0.116	0.0005336	1	1.191	0.000990218	0.25	0.00	0.025	0.04
Uranium	39.160	0.00369	0.1445004	0.02	0.116	0.00232	1	1.191	0.123274895	5	0.02	0.5	0.25
Vanadium	15.196	0.00369	0.056074163	0.001767	0.116	0.000204933	1	1.191	0.047253649	2.1	0.02	0.21	0.23
Zinc	65.175	0.00369	0.24049575	0.017	0.116	0.001972	1	1.191	0.203583333	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 35. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00496	0.0024738	0.001881	0.0131	2.46444E-05	1	0.1064	0.02348162	NS	N/A	NS	N/A
Arsenic	7.35	0.00496	0.036456	0.0025	0.0131	0.00003275	1	0.1064	0.34293938	22.8	0.02	5.7	0.06
Beryllium	1.07	0.00496	0.0053072	0.00005	0.0131	0.000000655	1	0.1064	0.049885855	NS	N/A	NS	N/A
Cadmium	0.33	0.00496	0.0016244	0.00088	0.0131	1.15315E-05	1	0.1064	0.015375296	3.4	0.00	0.85	0.02
Cobalt	8.68	0.00496	0.043028	0.000766	0.0131	1.00297E-05	1	0.1064	0.40449276	43.9	0.01	23.1	0.02
Copper	16.98	0.00496	0.084196	0.0044	0.0131	0.00005764	1	0.1064	0.791857519	33.2	0.02	26.9	0.03
Manganese	632.00	0.00496	3.13472	0.0944	0.0131	0.00123664	1	0.1064	29.47327669	9770	0.00	977	0.03
Molybdenum	1.74	0.00496	0.0086118	NM	0.0131	N/A	1	0.1064	0.08093797	35.5	0.00	3.55	0.02
Nickel	17.18	0.00496	0.085188	0.0259	0.0131	0.000339294	1	0.1064	0.803827949	79	0.01	57.2	0.01
Selenium	0.20	0.00496	0.0009858	0.0005	0.0131	0.00000655	1	0.1064	0.009326598	0.8	0.01	0.4	0.02
Uranium	24.88	0.00496	0.12338	0.0505	0.0131	0.00066155	1	0.1064	1.165804041	1,600	0.00	160	0.01
Vanadium	25.55	0.00496	0.126728	0.001365	0.0131	1.78774E-05	1	0.1064	1.191220652	114	0.01	11.4	0.10
Zinc	54.85	0.00496	0.272056	0.029735	0.0131	0.00038953	1	0.1064	2.560578292	224	0.01	10.5	0.24

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 25. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Upper Eastern Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.50	0.00369	0.001840388	0.001881	0.116	0.000218225	1	1.191	0.001728474	0.62	0.00	0.062	0.03
Arsenic	7.35	0.00369	0.0271215	0.0025	0.116	0.00029	1	1.191	0.023015533	9.63	0.00	1.91	0.01
Beryllium	1.07	0.00369	0.0039483	0.00005	0.116	0.0000058	1	1.191	0.003319983	6.2	0.00	0.62	0.01
Cadmium	0.33	0.00369	0.001208475	0.00088	0.116	0.000102111	1	1.191	0.001100408	2.3	0.00	0.23	0.00
Cobalt	8.68	0.00369	0.03201075	0.000766	0.116	8.88125E-05	1	1.191	0.026951774	20	0.00	5	0.01
Copper	16.98	0.00369	0.06263775	0.0044	0.116	0.0005104	1	1.191	0.053021117	35.4	0.00	24.3	0.00
Manganese	632.00	0.00369	2.33208	0.0944	0.116	0.0109504	1	1.191	1.967279933	268	0.01	83	0.02
Molybdenum	1.74	0.00369	0.006406763	NM	0.116	N/A	1	1.191	0.005379314	1.9	0.00	0.19	0.03
Nickel	17.18	0.00369	0.06337575	0.0259	0.116	0.003004433	1	1.191	0.055734831	42.1	0.00	23.1	0.00
Selenium	0.20	0.00369	0.000733388	0.0005	0.116	0.000058	1	1.191	0.000664473	0.25	0.00	0.025	0.03
Uranium	24.88	0.00369	0.09178875	0.0505	0.116	0.005858	1	1.191	0.081987196	5	0.02	0.5	0.16
Vanadium	25.55	0.00369	0.0942795	0.001365	0.116	0.000158304	1	1.191	0.079292866	2.1	0.04	0.21	0.38
Zinc	54.85	0.00369	0.2023965	0.029735	0.116	0.003449276	1	1.191	0.172834404	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PN 33. Hazard Quotient Calculations for a Sediment Invertebrate Feeding Bird (Wilson's Snipe)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00496			0.0131		1	0.1064					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.470	0.00496	0.0023312	0.0005	0.0131	0.00000655	1	0.1064	0.021971335	NS	N/A	NS	N/A
Arsenic	4.655	0.00496	0.0230888	0.004353	0.0131	5.70178E-05	1	0.1064	0.217535881	22.8	0.01	5.7	0.04
Beryllium	0.675	0.00496	0.00334924	0.002906	0.0131	3.80719E-05	1	0.1064	0.031835638	NS	N/A	NS	N/A
Cadmium	0.198	0.00496	0.0009796	0.002929	0.0131	3.83753E-05	1	0.1064	0.009567437	3.4	0.00	0.85	0.01
Cobalt	7.403	0.00496	0.0367164	0.0044	0.0131	0.00005764	1	0.1064	0.345620677	43.9	0.01	23.1	0.01
Copper	9.888	0.00496	0.049042	0.047162	0.0131	0.000617827	1	0.1064	0.466727696	33.2	0.01	26.9	0.02
Manganese	890.425	0.00496	4.416508	8.719	0.0131	0.1142189	1	0.1064	42.58201974	9770	0.00	977	0.04
Molybdenum	1.618	0.00496	0.0080228	NM	0.0131	N/A	1	0.1064	0.075402256	35.5	0.00	3.55	0.02
Nickel	9.831	0.00496	0.048763	0.242769	0.0131	0.003180271	1	0.1064	0.488188634	79	0.01	57.2	0.01
Selenium	0.443	0.00496	0.0021948	0.001	0.0131	0.0000131	1	0.1064	0.02075094	0.8	0.03	0.4	0.05
Uranium	78.950	0.00496	0.391592	0.1	0.0131	0.00131	1	0.1064	3.69268797	1,600	0.00	160	0.02
Vanadium	19.378	0.00496	0.0961124	0.00025	0.0131	0.000003275	1	0.1064	0.90334281	114	0.01	11.4	0.08
Zinc	30.950	0.00496	0.153512	0.298059	0.0131	0.003904571	1	0.1064	1.479479047	224	0.01	10.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
N/A: Value could not be calculated with the information available

TABLE PC 23. Hazard Quotient Calculations for an Herbivorous Mammal (Muskrat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00369			0.116		1	1.191					
COPC	Conc. in Sediment (mg/kg d.w.)	Sediment Ingestion Rate (kg/day w.w.)	Total Intake through Sediment (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Antimony	0.470	0.00369	0.0017343	0.0005	0.116	0.000058	1	1.191	0.00150487	0.62	0.00	0.062	0.02
Arsenic	4.655	0.00369	0.01717695	0.004353	0.116	0.00050489	1	1.191	0.014846213	9.63	0.00	1.91	0.01
Beryllium	0.675	0.00369	0.002491673	0.002906	0.116	0.000337125	1	1.191	0.002375145	6.2	0.00	0.62	0.00
Cadmium	0.198	0.00369	0.000728775	0.002929	0.116	0.000339812	1	1.191	0.000897218	2.3	0.00	0.23	0.00
Cobalt	7.403	0.00369	0.027315225	0.0044	0.116	0.0005104	1	1.191	0.023363245	20	0.00	5	0.00
Copper	9.888	0.00369	0.036484875	0.047162	0.116	0.005470833	1	1.191	0.035227295	35.4	0.00	24.3	0.00
Manganese	890.425	0.00369	3.28566825	8.719	0.116	1.011404	1	1.191	3.607953191	268	0.01	83	0.04
Molybdenum	1.618	0.00369	0.005968575	NM	0.116	N/A	1	1.191	0.005011398	1.9	0.00	0.19	0.03
Nickel	9.831	0.00369	0.036277313	0.242769	0.116	0.028161175	1	1.191	0.054104524	42.1	0.00	23.1	0.00
Selenium	0.443	0.00369	0.001632825	0.001	0.116	0.000116	1	1.191	0.001468367	0.25	0.01	0.025	0.06
Uranium	78.950	0.00369	0.2913255	0.1	0.116	0.0116	1	1.191	0.254345508	5	0.05	0.5	0.51
Vanadium	19.378	0.00369	0.071502975	0.00025	0.116	0.000029	1	1.191	0.060060432	2.1	0.03	0.21	0.29
Zinc	30.950	0.00369	0.1142055	0.298059	0.116	0.034574824	1	1.191	0.124920507	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
N/A: Value could not be calculated with the information available

TABLE PJ 5. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000538			0.00392		1	0.0175					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.0000538	0.00497112	0.0093	0.00392	0.000036456	1	0.0175	0.2861472	22.8	0.01	5.7	0.05
Cadmium	0.86	0.0000538	0.000046268	0.0044	0.00392	0.000017248	1	0.0175	0.003629486	3.4	0.00	0.85	0.00
Chromium	21.2	0.0000538	0.00114056	0.0169	0.00392	0.000066248	1	0.0175	0.068960457	5	0.01	1	0.07
Cobalt	19.4	0.0000538	0.00104372	0.0024	0.00392	0.000009408	1	0.0175	0.060178743	43.9	0.00	23.1	0.00
Copper	58.4	0.0000538	0.00314192	0.051	0.00392	0.00019992	1	0.0175	0.190962286	33.2	0.01	26.9	0.01
Lead	28.9	0.0000538	0.00155482	0.0059	0.00392	0.000023128	1	0.0175	0.090168457	15	0.01	1.5	0.06
Manganese	1160	0.0000538	0.062408	15.9	0.00392	0.062328	1	0.0175	7.127771429	9770	0.00	977	0.01
Molybdenum	5	0.0000538	0.000269	NM	0.00392	N/A	1	0.0175	0.015371429	35.5	0.00	3.55	0.00
Nickel	28.6	0.0000538	0.00153868	0.32	0.00392	0.0012544	1	0.0175	0.159604571	79	0.00	57.2	0.00
Selenium	0.095	0.0000538	0.000005111	0.0005	0.00392	0.00000196	1	0.0175	0.000404057	0.8	0.00	0.4	0.00
Thallium	0.25	0.0000538	0.00001345	0.0015	0.00392	0.00000588	1	0.0175	0.001104571	1.2	0.00	0.12	0.01
Uranium	88.6	0.0000538	0.00476668	0.13	0.00392	0.0005096	1	0.0175	0.301501714	1600	0.00	160	0.00
Vanadium	40.9	0.0000538	0.00220042	0.0082	0.00392	0.000032144	1	0.0175	0.127575086	114	0.00	11.4	0.01
Zinc	90.3	0.0000538	0.00485814	0.38	0.00392	0.0014896	1	0.0175	0.362728	223.5	0.00	10.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 5. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000182	0.0168168	0.0093	0.003	0.0000279	1	0.0114	1.477605263	22.8	0.06	5.7	0.26
Cadmium	0.86	0.000182	0.00015652	0.0044	0.003	0.0000132	1	0.0114	0.014887719	3.4	0.00	0.85	0.02
Chromium	21.2	0.000182	0.0038584	0.0169	0.003	0.0000507	1	0.0114	0.342903509	5	0.07	1	0.34
Cobalt	19.4	0.000182	0.0035308	0.0024	0.003	0.0000072	1	0.0114	0.310350877	43.9	0.01	23.1	0.01
Copper	58.4	0.000182	0.0106288	0.051	0.003	0.000153	1	0.0114	0.94577193	33.2	0.03	26.9	0.04
Lead	28.9	0.000182	0.0052598	0.0059	0.003	0.0000177	1	0.0114	0.462938596	15	0.03	1.5	0.31
Manganese	1160	0.000182	0.21112	15.9	0.003	0.0477	1	0.0114	22.70350877	9770	0.00	977	0.02
Molybdenum	5	0.000182	0.00091	NM	0.003	N/A	1	0.0114	0.079824561	35.5	0.00	3.55	0.02
Nickel	28.6	0.000182	0.0052052	0.32	0.003	0.00096	1	0.0114	0.540807018	79	0.01	57.2	0.01
Selenium	0.095	0.000182	0.00001729	0.0005	0.003	0.0000015	1	0.0114	0.001648246	0.8	0.00	0.4	0.00
Thallium	0.25	0.000182	0.0000455	0.0015	0.003	0.0000045	1	0.0114	0.004385965	1.2	0.00	0.12	0.04
Uranium	88.6	0.000182	0.0161252	0.13	0.003	0.00039	1	0.0114	1.448701754	1,600	0.00	160	0.01
Vanadium	40.9	0.000182	0.0074438	0.0082	0.003	0.0000246	1	0.0114	0.655122807	114	0.01	11.4	0.06
Zinc	90.3	0.000182	0.0164346	0.38	0.003	0.00114	1	0.0114	1.541631579	223.5	0.01	10.5	0.15

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 5. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, One Food Item
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000182	0.0168168	0.0093	0.003	0.0000279	1	0.0114	1.477605263	22.8	0.06	5.7	0.26
Cadmium	0.86	0.000182	0.00015652	0.0044	0.003	0.0000132	1	0.0114	0.014887719	3.4	0.00	0.85	0.02
Chromium	21.2	0.000182	0.0038584	0.0169	0.003	0.0000507	1	0.0114	0.342903509	5	0.07	1	0.34
Cobalt	19.4	0.000182	0.0035308	0.0024	0.003	0.0000072	1	0.0114	0.310350877	43.9	0.01	23.1	0.01
Copper	58.4	0.000182	0.0106288	0.051	0.003	0.000153	1	0.0114	0.94577193	33.2	0.03	26.9	0.04
Lead	28.9	0.000182	0.0052598	0.0059	0.003	0.0000177	1	0.0114	0.462938596	15	0.03	1.5	0.31
Manganese	1160	0.000182	0.21112	15.9	0.003	0.0477	1	0.0114	22.70350877	9770	0.00	977	0.02
Molybdenum	5	0.000182	0.00091	NM	0.003	N/A	1	0.0114	0.079824561	35.5	0.00	3.55	0.02
Nickel	28.6	0.000182	0.0052052	0.32	0.003	0.00096	1	0.0114	0.540807018	79	0.01	57.2	0.01
Selenium	0.095	0.000182	0.00001729	0.0005	0.003	0.0000015	1	0.0114	0.001648246	0.8	0.00	0.4	0.00
Thallium	0.25	0.000182	0.0000455	0.0015	0.003	0.0000045	1	0.0114	0.004385965	1.2	0.00	0.12	0.04
Uranium	88.6	0.000182	0.0161252	0.13	0.003	0.00039	1	0.0114	1.448701754	1600	0.00	160	0.01
Vanadium	40.9	0.000182	0.0074438	0.0082	0.003	0.0000246	1	0.0114	0.655122807	114	0.01	11.4	0.06
Zinc	90.3	0.000182	0.0164346	0.38	0.003	0.00114	1	0.0114	1.541631579	223.5	0.01	10.5	0.15

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PP 5. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00328			0.0128		1	0.103					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.00328	0.303072	0.0093	0.0128	0.00011904	1	0.103	2.94360233	22.8	0.13	5.7	0.52
Cadmium	0.86	0.00328	0.0028208	0.0044	0.0128	0.00005632	1	0.103	0.027933204	3.4	0.01	0.85	0.03
Chromium	21.2	0.00328	0.069536	0.0169	0.0128	0.00021632	1	0.103	0.67720699	5	0.14	1	0.68
Cobalt	19.4	0.00328	0.063632	0.0024	0.0128	0.00003072	1	0.103	0.61808466	43.9	0.01	23.1	0.03
Copper	58.4	0.00328	0.191552	0.051	0.0128	0.0006528	1	0.103	1.866066019	33.2	0.06	26.9	0.07
Lead	28.9	0.00328	0.094792	0.0059	0.0128	0.00007552	1	0.103	0.921043883	15	0.06	1.5	0.61
Manganese	1160	0.00328	3.8048	15.9	0.0128	0.20352	1	0.103	38.91572816	9770	0.00	977	0.04
Molybdenum	5	0.00328	0.0164	NM	0.0128	N/A	1	0.103	0.159223301	35.5	0.00	3.55	0.04
Nickel	28.6	0.00328	0.093808	0.32	0.0128	0.004096	1	0.103	0.950524272	79	0.01	57.2	0.02
Selenium	0.095	0.00328	0.0003116	0.0005	0.0128	0.0000064	1	0.103	0.003087379	0.8	0.00	0.4	0.01
Thallium	0.25	0.00328	0.00082	0.0015	0.0128	0.0000192	1	0.103	0.008147573	1.2	0.01	0.12	0.07
Uranium	88.6	0.00328	0.290608	0.13	0.0128	0.001664	1	0.103	2.837592233	1600	0.00	160	0.02
Vanadium	40.9	0.00328	0.134152	0.0082	0.0128	0.00010496	1	0.103	1.303465631	114	0.01	11.4	0.11
Zinc	90.3	0.00328	0.296184	0.38	0.0128	0.004864	1	0.103	2.922796117	223.5	0.01	10.5	0.28

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 5. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.02023	1.869252	0.0093	0.046	0.0004278	1	0.68	2.749529118	22.8	0.12	5.7	0.48
Cadmium	0.86	0.02023	0.0173978	0.0044	0.046	0.0002024	1	0.68	0.025882647	3.4	0.01	0.85	0.03
Chromium	21.2	0.02023	0.428876	0.0169	0.046	0.0007774	1	0.68	0.631843235	5	0.13	1	0.63
Cobalt	19.4	0.02023	0.392462	0.0024	0.046	0.0001104	1	0.68	0.577312353	43.9	0.01	23.1	0.02
Copper	58.4	0.02023	1.181432	0.051	0.046	0.002346	1	0.68	1.74085	33.2	0.05	26.9	0.06
Lead	28.9	0.02023	0.584647	0.0059	0.046	0.0002714	1	0.68	0.860174118	15	0.06	1.5	0.57
Manganese	1160	0.02023	23.4668	15.9	0.046	0.7314	1	0.68	35.58558824	9770	0.00	977	0.04
Molybdenum	5	0.02023	0.10115	NM	0.046	N/A	1	0.68	0.14875	35.5	0.00	3.55	0.04
Nickel	28.6	0.02023	0.578578	0.32	0.046	0.01472	1	0.68	0.872497059	79	0.01	57.2	0.02
Selenium	0.095	0.02023	0.00192185	0.0005	0.046	0.000023	1	0.68	0.002860074	0.8	0.00	0.4	0.01
Thallium	0.25	0.02023	0.0050575	0.0015	0.046	0.000069	1	0.68	0.007538971	1.2	0.01	0.12	0.06
Uranium	88.6	0.02023	1.792378	0.13	0.046	0.00598	1	0.68	2.644644118	1600	0.00	160	0.02
Vanadium	40.9	0.02023	0.827407	0.0082	0.046	0.0003772	1	0.68	1.217329706	114	0.01	11.4	0.11
Zinc	90.3	0.02023	1.826769	0.38	0.046	0.01748	1	0.68	2.712130882	223.5	0.01	10.5	0.26

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 5. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00189			0.035		1	0.45					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.00189	0.174636	0.0093	0.035	0.0003255	1	0.45	0.388803333	22.8	0.02	5.7	0.07
Cadmium	0.86	0.00189	0.0016254	0.0044	0.035	0.000154	1	0.45	0.003954222	3.4	0.00	0.85	0.00
Chromium	21.2	0.00189	0.040068	0.0169	0.035	0.0005915	1	0.45	0.090354444	5	0.02	1	0.09
Cobalt	19.4	0.00189	0.036666	0.0024	0.035	0.000084	1	0.45	0.081666667	43.9	0.00	23.1	0.00
Copper	58.4	0.00189	0.110376	0.051	0.035	0.001785	1	0.45	0.249246667	33.2	0.01	26.9	0.01
Lead	28.9	0.00189	0.054621	0.0059	0.035	0.0002065	1	0.45	0.121838889	15	0.01	1.5	0.08
Manganese	1160	0.00189	2.1924	15.9	0.035	0.5565	1	0.45	6.108666667	9770	0.00	977	0.01
Molybdenum	5	0.00189	0.00945	NM	0.035	N/A	1	0.45	0.021	35.5	0.00	3.55	0.01
Nickel	28.6	0.00189	0.054054	0.32	0.035	0.0112	1	0.45	0.145008889	79	0.00	57.2	0.00
Selenium	0.095	0.00189	0.00017955	0.0005	0.035	0.0000175	1	0.45	0.000437889	0.8	0.00	0.4	0.00
Thallium	0.25	0.00189	0.0004725	0.0015	0.035	0.0000525	1	0.45	0.001166667	1.2	0.00	0.12	0.01
Uranium	88.6	0.00189	0.167454	0.13	0.035	0.00455	1	0.45	0.382231111	1600	0.00	160	0.00
Vanadium	40.9	0.00189	0.077301	0.0082	0.035	0.000287	1	0.45	0.172417778	114	0.00	11.4	0.02
Zinc	90.3	0.00189	0.170667	0.38	0.035	0.0133	1	0.45	0.408815556	223.5	0.00	10.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 5. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000724	0.0668976	0.0093	0.0085	0.00007905	1	0.055	1.217757273	22.8	0.05	5.7	0.21
Cadmium	0.86	0.000724	0.00062264	0.0044	0.0085	0.0000374	1	0.055	0.012000727	3.4	0.00	0.85	0.01
Chromium	21.2	0.000724	0.0153488	0.0169	0.0085	0.00014365	1	0.055	0.281680909	5	0.06	1	0.28
Cobalt	19.4	0.000724	0.0140456	0.0024	0.0085	0.0000204	1	0.055	0.255745455	43.9	0.01	23.1	0.01
Copper	58.4	0.000724	0.0422816	0.051	0.0085	0.0004335	1	0.055	0.776638182	33.2	0.02	26.9	0.03
Lead	28.9	0.000724	0.0209236	0.0059	0.0085	0.00005015	1	0.055	0.381340909	15	0.03	1.5	0.25
Manganese	1160	0.000724	0.83984	15.9	0.0085	0.13515	1	0.055	17.72709091	9770	0.00	977	0.02
Molybdenum	5	0.000724	0.00362	NM	0.0085	N/A	1	0.055	0.065818182	35.5	0.00	3.55	0.02
Nickel	28.6	0.000724	0.0207064	0.32	0.0085	0.00272	1	0.055	0.425934545	79	0.01	57.2	0.01
Selenium	0.095	0.000724	0.00006878	0.0005	0.0085	0.00000425	1	0.055	0.001327818	0.8	0.00	0.4	0.00
Thallium	0.25	0.000724	0.000181	0.0015	0.0085	0.00001275	1	0.055	0.003522727	1.2	0.00	0.12	0.03
Uranium	88.6	0.000724	0.0641464	0.13	0.0085	0.001105	1	0.055	1.186389091	1600	0.00	160	0.01
Vanadium	40.9	0.000724	0.0296116	0.0082	0.0085	0.0000697	1	0.055	0.53966	114	0.00	11.4	0.05
Zinc	90.3	0.000724	0.0653772	0.38	0.0085	0.00323	1	0.055	1.247403636	223.5	0.01	10.5	0.12

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 5. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000142	0.0131208	0.0093	0.0061	0.00005673	1	0.02	0.6588765	9.63	0.07	1.91	0.34
Cadmium	0.86	0.000142	0.00012212	0.0044	0.0061	0.00002684	1	0.02	0.007448	2.3	0.00	0.23	0.03
Chromium	21.2	0.000142	0.0030104	0.0169	0.0061	0.00010309	1	0.02	0.1556745	56.8	0.00	5.68	0.03
Cobalt	19.4	0.000142	0.0027548	0.0024	0.0061	0.00001464	1	0.02	0.138472	20	0.01	5	0.03
Copper	58.4	0.000142	0.0082928	0.051	0.0061	0.0003111	1	0.02	0.430195	35.4	0.01	24.3	0.02
Lead	28.9	0.000142	0.0041038	0.0059	0.0061	0.00003599	1	0.02	0.2069895	80	0.00	8	0.03
Manganese	1160	0.000142	0.16472	15.9	0.0061	0.09699	1	0.02	13.0855	268	0.05	83	0.16
Molybdenum	5	0.000142	0.00071	NM	0.0061	N/A	1	0.02	0.0355	1.9	0.02	0.19	0.19
Nickel	28.6	0.000142	0.0040612	0.32	0.0061	0.001952	1	0.02	0.30066	42.1	0.01	23.1	0.01
Selenium	0.095	0.000142	0.00001349	0.0005	0.0061	0.00000305	1	0.02	0.000827	0.25	0.00	0.025	0.03
Thallium	0.25	0.000142	0.0000355	0.0015	0.0061	0.00000915	1	0.02	0.0022325	0.74	0.00	0.074	0.03
Uranium	88.6	0.000142	0.0125812	0.13	0.0061	0.000793	1	0.02	0.66871	5	0.13	0.5	**1.34**
Vanadium	40.9	0.000142	0.0058078	0.0082	0.0061	0.00005002	1	0.02	0.292891	2.1	0.14	0.21	**1.39**
Zinc	90.3	0.000142	0.0128226	0.38	0.0061	0.002318	1	0.02	0.75703	225	0.00	22.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 5. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.666	61.5384	0.0093	13.5	0.12555	1	22	2.802906818	9.63	0.29	1.91	**1.47**
Cadmium	0.86	0.666	0.57276	0.0044	13.5	0.0594	1	22	0.028734545	2.3	0.01	0.23	0.12
Chromium	21.2	0.666	14.1192	0.0169	13.5	0.22815	1	22	0.652152273	56.8	0.01	5.68	0.11
Cobalt	19.4	0.666	12.9204	0.0024	13.5	0.0324	1	22	0.588763636	20	0.03	5	0.12
Copper	58.4	0.666	38.8944	0.051	13.5	0.6885	1	22	1.799222727	35.4	0.05	24.3	0.07
Lead	28.9	0.666	19.2474	0.0059	13.5	0.07965	1	22	0.878502273	80	0.01	8	0.11
Manganese	1160	0.666	772.56	15.9	13.5	214.65	1	22	44.87318182	268	0.17	83	0.54
Molybdenum	5	0.666	3.33	NM	13.5	N/A	1	22	0.151363636	1.9	0.08	0.19	0.80
Nickel	28.6	0.666	19.0476	0.32	13.5	4.32	1	22	1.062163636	42.1	0.03	23.1	0.05
Selenium	0.095	0.666	0.06327	0.0005	13.5	0.00675	1	22	0.003182727	0.25	0.01	0.025	0.13
Thallium	0.25	0.666	0.1665	0.0015	13.5	0.02025	1	22	0.008488636	0.74	0.01	0.074	0.11
Uranium	88.6	0.666	59.0076	0.13	13.5	1.755	1	22	2.761936364	5	0.55	0.5	**5.52**
Vanadium	40.9	0.666	27.2394	0.0082	13.5	0.1107	1	22	1.243186364	2.1	0.59	0.21	**5.92**
Zinc	90.3	0.666	60.1398	0.38	13.5	5.13	1	22	2.966809091	225	0.01	22.5	0.13

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 5. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.0122	1.12728	0.0093	0.57	0.005301	1	7	0.161797286	9.63	0.02	1.91	0.08
Cadmium	0.86	0.0122	0.010492	0.0044	0.57	0.002508	1	7	0.001857143	2.3	0.00	0.23	0.01
Chromium	21.2	0.0122	0.25864	0.0169	0.57	0.009633	1	7	0.038324714	56.8	0.00	5.68	0.01
Cobalt	19.4	0.0122	0.23668	0.0024	0.57	0.001368	1	7	0.034006857	20	0.00	5	0.01
Copper	58.4	0.0122	0.71248	0.051	0.57	0.02907	1	7	0.105935714	35.4	0.00	24.3	0.00
Lead	28.9	0.0122	0.35258	0.0059	0.57	0.003363	1	7	0.050849	80	0.00	8	0.01
Manganese	1160	0.0122	14.152	15.9	0.57	9.063	1	7	3.316428571	268	0.01	83	0.04
Molybdenum	5	0.0122	0.061	NM	0.57	N/A	1	7	0.008714286	1.9	0.00	0.19	0.05
Nickel	28.6	0.0122	0.34892	0.32	0.57	0.1824	1	7	0.075902857	42.1	0.00	23.1	0.00
Selenium	0.095	0.0122	0.001159	0.0005	0.57	0.000285	1	7	0.000206286	0.25	0.00	0.025	0.01
Thallium	0.25	0.0122	0.00305	0.0015	0.57	0.000855	1	7	0.000557857	0.74	0.00	0.074	0.01
Uranium	88.6	0.0122	1.08092	0.13	0.57	0.0741	1	7	0.165002857	5	0.03	0.5	0.33
Vanadium	40.9	0.0122	0.49898	0.0082	0.57	0.004674	1	7	0.071950571	2.1	0.03	0.21	0.34
Zinc	90.3	0.0122	1.10166	0.38	0.57	0.2166	1	7	0.188322857	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 5. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.00868	0.802032	0.0093	0.329	0.0030597	1	3.8	0.211866237	9.63	0.02	1.91	0.11
Cadmium	0.86	0.00868	0.0074648	0.0044	0.329	0.0014476	1	3.8	0.002345368	2.3	0.00	0.23	0.01
Chromium	21.2	0.00868	0.184016	0.0169	0.329	0.0055601	1	3.8	0.049888447	56.8	0.00	5.68	0.01
Cobalt	19.4	0.00868	0.168392	0.0024	0.329	0.0007896	1	3.8	0.044521474	20	0.00	5	0.01
Copper	58.4	0.00868	0.506912	0.051	0.329	0.016779	1	3.8	0.137813421	35.4	0.00	24.3	0.01
Lead	28.9	0.00868	0.250852	0.0059	0.329	0.0019411	1	3.8	0.0665245	80	0.00	8	0.01
Manganese	1160	0.00868	10.0688	15.9	0.329	5.2311	1	3.8	4.026289474	268	0.02	83	0.05
Molybdenum	5	0.00868	0.0434	NM	0.329	N/A	1	3.8	0.011421053	1.9	0.01	0.19	0.06
Nickel	28.6	0.00868	0.248248	0.32	0.329	0.10528	1	3.8	0.093033684	42.1	0.00	23.1	0.00
Selenium	0.095	0.00868	0.0008246	0.0005	0.329	0.0001645	1	3.8	0.000260289	0.25	0.00	0.025	0.01
Thallium	0.25	0.00868	0.00217	0.0015	0.329	0.0004935	1	3.8	0.000700921	0.74	0.00	0.074	0.01
Uranium	88.6	0.00868	0.769048	0.13	0.329	0.04277	1	3.8	0.213636316	5	0.04	0.5	0.43
Vanadium	40.9	0.00868	0.355012	0.0082	0.329	0.0026978	1	3.8	0.094134158	2.1	0.04	0.21	0.45
Zinc	90.3	0.00868	0.783804	0.38	0.329	0.12502	1	3.8	0.239164211	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 5. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000234	0.0216216	0.0093	0.00157	0.000014601	1	0.002	10.8181005	9.63	**1.12**	1.91	**5.66**
Cadmium	0.86	0.000234	0.00020124	0.0044	0.00157	0.000006908	1	0.002	0.104074	2.3	0.05	0.23	0.45
Chromium	21.2	0.000234	0.0049608	0.0169	0.00157	0.000026533	1	0.002	2.4936665	56.8	0.04	5.68	0.44
Cobalt	19.4	0.000234	0.0045396	0.0024	0.00157	0.000003768	1	0.002	2.271684	20	0.11	5	0.45
Copper	58.4	0.000234	0.0136656	0.051	0.00157	0.00008007	1	0.002	6.872835	35.4	0.19	24.3	0.28
Lead	28.9	0.000234	0.0067626	0.0059	0.00157	0.000009263	1	0.002	3.3859315	80	0.04	8	0.42
Manganese	1160	0.000234	0.27144	15.9	0.00157	0.024963	1	0.002	148.2015	268	0.55	83	**1.79**
Molybdenum	5	0.000234	0.00117	NM	0.00157	N/A	1	0.002	0.585	1.9	0.31	0.19	**3.08**
Nickel	28.6	0.000234	0.0066924	0.32	0.00157	0.0005024	1	0.002	3.5974	42.1	0.09	23.1	0.16
Selenium	0.095	0.000234	0.00002223	0.0005	0.00157	0.000000785	1	0.002	0.0115075	0.25	0.05	0.025	0.46
Thallium	0.25	0.000234	0.0000585	0.0015	0.00157	0.000002355	1	0.002	0.0304275	0.74	0.04	0.074	0.41
Uranium	88.6	0.000234	0.0207324	0.13	0.00157	0.0002041	1	0.002	10.46825	5	**2.09**	0.5	**20.94**
Vanadium	40.9	0.000234	0.0095706	0.0082	0.00157	0.000012874	1	0.002	4.791737	2.1	**2.28**	0.21	**22.82**
Zinc	90.3	0.000234	0.0211302	0.38	0.00157	0.0005966	1	0.002	10.8634	225	0.05	22.5	0.48

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 5. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000977	0.0902748	0.0093	0.00378	0.000035154	1	0.009	10.03443933	9.63	**1.04**	1.91	**5.25**
Cadmium	0.86	0.000977	0.00084022	0.0044	0.00378	0.000016632	1	0.009	0.095205778	2.3	0.04	0.23	0.41
Chromium	21.2	0.000977	0.0207124	0.0169	0.00378	0.000063882	1	0.009	2.308475778	56.8	0.04	5.68	0.41
Cobalt	19.4	0.000977	0.0189538	0.0024	0.00378	0.000009072	1	0.009	2.106985778	20	0.11	5	0.42
Copper	58.4	0.000977	0.0570568	0.051	0.00378	0.00019278	1	0.009	6.361064444	35.4	0.18	24.3	0.26
Lead	28.9	0.000977	0.0282353	0.0059	0.00378	0.000022302	1	0.009	3.139733556	80	0.04	8	0.39
Manganese	1160	0.000977	1.13332	15.9	0.00378	0.060102	1	0.009	132.6024444	268	0.49	83	**1.60**
Molybdenum	5	0.000977	0.004885	NM	0.00378	N/A	1	0.009	0.542777778	1.9	0.29	0.19	**2.86**
Nickel	28.6	0.000977	0.0279422	0.32	0.00378	0.0012096	1	0.009	3.239088889	42.1	0.08	23.1	0.14
Selenium	0.095	0.000977	0.000092815	0.0005	0.00378	0.00000189	1	0.009	0.010522778	0.25	0.04	0.025	0.42
Thallium	0.25	0.000977	0.00024425	0.0015	0.00378	0.00000567	1	0.009	0.027768889	0.74	0.04	0.074	0.38
Uranium	88.6	0.000977	0.0865622	0.13	0.00378	0.0004914	1	0.009	9.672622222	5	**1.93**	0.5	**19.35**
Vanadium	40.9	0.000977	0.0399593	0.0082	0.00378	0.000030996	1	0.009	4.443366222	2.1	**2.12**	0.21	**21.16**
Zinc	90.3	0.000977	0.0882231	0.38	0.00378	0.0014364	1	0.009	9.962166667	225	0.04	22.5	0.44

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 1. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000538			0.00392		1	0.0175					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.0000538	0.0128582	0.0163	0.00392	0.000063896	1	0.0175	0.738405486	22.8	0.03	5.7	0.13
Cadmium	3.5	0.0000538	0.0001883	0.07	0.00392	0.0002744	1	0.0175	0.02644	3.4	0.01	0.85	0.03
Chromium	66	0.0000538	0.0035508	0.0343	0.00392	0.000134456	1	0.0175	0.210586057	5	0.04	1	0.21
Cobalt	19.9	0.0000538	0.00107062	1.1	0.00392	0.004312	1	0.0175	0.307578286	43.9	0.01	23.1	0.01
Copper	83	0.0000538	0.0044654	0.286	0.00392	0.00112112	1	0.0175	0.319229714	33.2	0.01	26.9	0.01
Lead	84	0.0000538	0.0045192	0.0394	0.00392	0.000154448	1	0.0175	0.2670656	15	0.02	1.5	0.18
Manganese	5190	0.0000538	0.279222	120	0.00392	0.4704	1	0.0175	42.83554286	9770	0.00	977	0.04
Molybdenum	31.9	0.0000538	0.00171622	NM	0.00392	N/A	1	0.0175	0.098069714	35.5	0.00	3.55	0.03
Nickel	44	0.0000538	0.0023672	2.43	0.00392	0.0095256	1	0.0175	0.679588571	79	0.01	57.2	0.01
Selenium	90	0.0000538	0.004842	0.0653	0.00392	0.000255976	1	0.0175	0.291312914	0.8	0.36	0.4	0.73
Thallium	2.5	0.0000538	0.0001345	0.0002	0.00392	0.000000784	1	0.0175	0.007730514	1.2	0.01	0.12	0.06
Uranium	482	0.0000538	0.0259316	24	0.00392	0.09408	1	0.0175	6.857805714	1600	0.00	160	0.04
Vanadium	132	0.0000538	0.0071016	0.0005	0.00392	0.00000196	1	0.0175	0.405917714	114	0.00	11.4	0.04
Zinc	381	0.0000538	0.0204978	5.48	0.00392	0.0214816	1	0.0175	2.398822857	223.5	0.01	10.5	0.23

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
w.w.: Wet weight
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 1. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000182	0.043498	0.0163	0.003	0.0000489	1	0.0114	3.819903509	22.8	0.17	5.7	0.67
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	1	0.0114	0.074298246	3.4	0.02	0.85	0.09
Chromium	66	0.000182	0.012012	0.0343	0.003	0.0001029	1	0.0114	1.062710526	5	0.21	1	**1.06**
Cobalt	19.9	0.000182	0.0036218	1.1	0.003	0.0033	1	0.0114	0.607175439	43.9	0.01	23.1	0.03
Copper	83	0.000182	0.015106	0.286	0.003	0.000858	1	0.0114	1.400350877	33.2	0.04	26.9	0.05
Lead	84	0.000182	0.015288	0.0394	0.003	0.0001182	1	0.0114	1.351421053	15	0.09	1.5	0.90
Manganese	5190	0.000182	0.94458	120	0.003	0.36	1	0.0114	114.4368421	9770	0.01	977	0.12
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	1	0.0114	0.509280702	35.5	0.01	3.55	0.14
Nickel	44	0.000182	0.008008	2.43	0.003	0.00729	1	0.0114	1.341929825	79	0.02	57.2	0.02
Selenium	90	0.000182	0.01638	0.0653	0.003	0.0001959	1	0.0114	1.454026316	0.8	**1.82**	0.4	**3.64**
Thallium	2.5	0.000182	0.000455	0.0002	0.003	0.0000006	1	0.0114	0.039964912	1.2	0.03	0.12	0.33
Uranium	482	0.000182	0.087724	24	0.003	0.072	1	0.0114	14.01087719	1,600	0.01	160	0.09
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	1	0.0114	2.1075	114	0.02	11.4	0.18
Zinc	381	0.000182	0.069342	5.48	0.003	0.01644	1	0.0114	7.524736842	223.5	0.03	10.5	0.72

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PL 1. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, One Food Item
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000182	0.043498	0.0163	0.003	0.0000489	1	0.0114	3.819903509	22.8	0.17	5.7	0.67
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	1	0.0114	0.074298246	3.4	0.02	0.85	0.09
Chromium	66	0.000182	0.012012	0.0343	0.003	0.0001029	1	0.0114	1.062710526	5	0.21	1	**1.06**
Cobalt	19.9	0.000182	0.0036218	1.1	0.003	0.0033	1	0.0114	0.607175439	43.9	0.01	23.1	0.03
Copper	83	0.000182	0.015106	0.286	0.003	0.000858	1	0.0114	1.400350877	33.2	0.04	26.9	0.05
Lead	84	0.000182	0.015288	0.0394	0.003	0.0001182	1	0.0114	1.351421053	15	0.09	1.5	0.90
Manganese	5190	0.000182	0.94458	120	0.003	0.36	1	0.0114	114.4368421	9770	0.01	977	0.12
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	1	0.0114	0.509280702	35.5	0.01	3.55	0.14
Nickel	44	0.000182	0.008008	2.43	0.003	0.00729	1	0.0114	1.341929825	79	0.02	57.2	0.02
Selenium	90	0.000182	0.01638	0.0653	0.003	0.0001959	1	0.0114	1.454026316	0.8	**1.82**	0.4	**3.64**
Thallium	2.5	0.000182	0.000455	0.0002	0.003	0.0000006	1	0.0114	0.039964912	1.2	0.03	0.12	0.33
Uranium	482	0.000182	0.087724	24	0.003	0.072	1	0.0114	14.01087719	1600	0.01	160	0.09
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	1	0.0114	2.1075	114	0.02	11.4	0.18
Zinc	381	0.000182	0.069342	5.48	0.003	0.01644	1	0.0114	7.524736842	223.5	0.03	10.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 1. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00328			0.0128		1	0.103					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.00328	0.78392	0.0163	0.0128	0.00020864	1	0.103	7.612899417	22.8	0.33	5.7	**1.34**
Cadmium	3.5	0.00328	0.01148	0.07	0.0128	0.000896	1	0.103	0.12015534	3.4	0.04	0.85	0.14
Chromium	66	0.00328	0.21648	0.0343	0.0128	0.00043904	1	0.103	2.106010097	5	0.42	1	**2.11**
Cobalt	19.9	0.00328	0.065272	1.1	0.0128	0.01408	1	0.103	0.770407767	43.9	0.02	23.1	0.03
Copper	83	0.00328	0.27224	0.286	0.0128	0.0036608	1	0.103	2.678648544	33.2	0.08	26.9	0.10
Lead	84	0.00328	0.27552	0.0394	0.0128	0.00050432	1	0.103	2.679847767	15	0.18	1.5	**1.79**
Manganese	5190	0.00328	17.0232	120	0.0128	1.536	1	0.103	180.1864078	9770	0.02	977	0.18
Molybdenum	31.9	0.00328	0.104632	NM	0.0128	N/A	1	0.103	1.01584466	35.5	0.03	3.55	0.29
Nickel	44	0.00328	0.14432	2.43	0.0128	0.031104	1	0.103	1.703145631	79	0.02	57.2	0.03
Selenium	90	0.00328	0.2952	0.0653	0.0128	0.00083584	1	0.103	2.874134369	0.8	**3.59**	0.4	**7.19**
Thallium	2.5	0.00328	0.0082	0.0002	0.0128	0.00000256	1	0.103	0.079636505	1.2	0.07	0.12	0.66
Uranium	482	0.00328	1.58096	24	0.0128	0.3072	1	0.103	18.33165049	1600	0.01	160	0.11
Vanadium	132	0.00328	0.43296	0.0005	0.0128	0.0000064	1	0.103	4.203557282	114	0.04	11.4	0.37
Zinc	381	0.00328	1.24968	5.48	0.0128	0.070144	1	0.103	12.81382524	223.5	0.06	10.5	**1.22**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 1. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.02023	4.83497	0.0163	0.046	0.0007498	1	0.68	7.111352647	22.8	0.31	5.7	**1.25**
Cadmium	3.5	0.02023	0.070805	0.07	0.046	0.00322	1	0.68	0.108860294	3.4	0.03	0.85	0.13
Chromium	66	0.02023	1.33518	0.0343	0.046	0.0015778	1	0.68	1.965820294	5	0.39	1	**1.97**
Cobalt	19.9	0.02023	0.402577	1.1	0.046	0.0506	1	0.68	0.666436765	43.9	0.02	23.1	0.03
Copper	83	0.02023	1.67909	0.286	0.046	0.013156	1	0.68	2.488597059	33.2	0.07	26.9	0.09
Lead	84	0.02023	1.69932	0.0394	0.046	0.0018124	1	0.68	2.501665294	15	0.17	1.5	**1.67**
Manganese	5190	0.02023	104.9937	120	0.046	5.52	1	0.68	162.5201471	9770	0.02	977	0.17
Molybdenum	31.9	0.02023	0.645337	NM	0.046	N/A	1	0.68	0.949025	35.5	0.03	3.55	0.27
Nickel	44	0.02023	0.89012	2.43	0.046	0.11178	1	0.68	1.473382353	79	0.02	57.2	0.03
Selenium	90	0.02023	1.8207	0.0653	0.046	0.0030038	1	0.68	2.681917353	0.8	**3.35**	0.4	**6.70**
Thallium	2.5	0.02023	0.050575	0.0002	0.046	0.0000092	1	0.68	0.074388529	1.2	0.06	0.12	0.62
Uranium	482	0.02023	9.75086	24	0.046	1.104	1	0.68	15.96302941	1600	0.01	160	0.10
Vanadium	132	0.02023	2.67036	0.0005	0.046	0.000023	1	0.68	3.927033824	114	0.03	11.4	0.34
Zinc	381	0.02023	7.70763	5.48	0.046	0.25208	1	0.68	11.70545588	223.5	0.05	10.5	**1.11**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 1. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00189			0.035		1	0.45					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.00189	0.45171	0.0163	0.035	0.0005705	1	0.45	1.005067778	22.8	0.04	5.7	0.18
Cadmium	3.5	0.00189	0.006615	0.07	0.035	0.00245	1	0.45	0.020144444	3.4	0.01	0.85	0.02
Chromium	66	0.00189	0.12474	0.0343	0.035	0.0012005	1	0.45	0.279867778	5	0.06	1	0.28
Cobalt	19.9	0.00189	0.037611	1.1	0.035	0.0385	1	0.45	0.169135556	43.9	0.00	23.1	0.01
Copper	83	0.00189	0.15687	0.286	0.035	0.01001	1	0.45	0.370844444	33.2	0.01	26.9	0.01
Lead	84	0.00189	0.15876	0.0394	0.035	0.001379	1	0.45	0.355864444	15	0.02	1.5	0.24
Manganese	5190	0.00189	9.8091	120	0.035	4.2	1	0.45	31.13133333	9770	0.00	977	0.03
Molybdenum	31.9	0.00189	0.060291	NM	0.035	N/A	1	0.45	0.13398	35.5	0.00	3.55	0.04
Nickel	44	0.00189	0.08316	2.43	0.035	0.08505	1	0.45	0.3738	79	0.00	57.2	0.01
Selenium	90	0.00189	0.1701	0.0653	0.035	0.0022855	1	0.45	0.383078889	0.8	0.48	0.4	0.96
Thallium	2.5	0.00189	0.004725	0.0002	0.035	0.000007	1	0.45	0.010515556	1.2	0.01	0.12	0.09
Uranium	482	0.00189	0.91098	24	0.035	0.84	1	0.45	3.891066667	1600	0.00	160	0.02
Vanadium	132	0.00189	0.24948	0.0005	0.035	0.0000175	1	0.45	0.554438889	114	0.00	11.4	0.05
Zinc	381	0.00189	0.72009	5.48	0.035	0.1918	1	0.45	2.026422222	223.5	0.01	10.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 1. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000724	0.173036	0.0163	0.0085	0.00013855	1	0.055	3.148628182	22.8	0.14	5.7	0.55
Cadmium	3.5	0.000724	0.002534	0.07	0.0085	0.000595	1	0.055	0.056890909	3.4	0.02	0.85	0.07
Chromium	66	0.000724	0.047784	0.0343	0.0085	0.00029155	1	0.055	0.874100909	5	0.17	1	0.87
Cobalt	19.9	0.000724	0.0144076	1.1	0.0085	0.00935	1	0.055	0.431956364	43.9	0.01	23.1	0.02
Copper	83	0.000724	0.060092	0.286	0.0085	0.002431	1	0.055	1.136781818	33.2	0.03	26.9	0.04
Lead	84	0.000724	0.060816	0.0394	0.0085	0.0003349	1	0.055	1.111834545	15	0.07	1.5	0.74
Manganese	5190	0.000724	3.75756	120	0.0085	1.02	1	0.055	86.86472727	9770	0.01	977	0.09
Molybdenum	31.9	0.000724	0.0230956	NM	0.0085	N/A	1	0.055	0.41992	35.5	0.01	3.55	0.12
Nickel	44	0.000724	0.031856	2.43	0.0085	0.020655	1	0.055	0.954745455	79	0.01	57.2	0.02
Selenium	90	0.000724	0.06516	0.0653	0.0085	0.00055505	1	0.055	1.194819091	0.8	**1.49**	0.4	**2.99**
Thallium	2.5	0.000724	0.00181	0.0002	0.0085	0.0000017	1	0.055	0.03294	1.2	0.03	0.12	0.27
Uranium	482	0.000724	0.348968	24	0.0085	0.204	1	0.055	10.05396364	1600	0.01	160	0.06
Vanadium	132	0.000724	0.095568	0.0005	0.0085	0.00000425	1	0.055	1.737677273	114	0.02	11.4	0.15
Zinc	381	0.000724	0.275844	5.48	0.0085	0.04658	1	0.055	5.862254545	223.5	0.03	10.5	0.56

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 1. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000142	0.033938	0.0163	0.0061	0.00009943	1	0.02	1.7018715	9.63	0.18	1.91	0.89
Cadmium	3.5	0.000142	0.000497	0.07	0.0061	0.000427	1	0.02	0.0462	2.3	0.02	0.23	0.20
Chromium	66	0.000142	0.009372	0.0343	0.0061	0.00020923	1	0.02	0.4790615	56.8	0.01	5.68	0.08
Cobalt	19.9	0.000142	0.0028258	1.1	0.0061	0.00671	1	0.02	0.47679	20	0.02	5	0.10
Copper	83	0.000142	0.011786	0.286	0.0061	0.0017446	1	0.02	0.67653	35.4	0.02	24.3	0.03
Lead	84	0.000142	0.011928	0.0394	0.0061	0.00024034	1	0.02	0.608417	80	0.01	8	0.08
Manganese	5190	0.000142	0.73698	120	0.0061	0.732	1	0.02	73.449	268	0.27	83	0.88
Molybdenum	31.9	0.000142	0.0045298	NM	0.0061	N/A	1	0.02	0.22649	1.9	0.12	0.19	**1.19**
Nickel	44	0.000142	0.006248	2.43	0.0061	0.014823	1	0.02	1.05355	42.1	0.03	23.1	0.05
Selenium	90	0.000142	0.01278	0.0653	0.0061	0.00039833	1	0.02	0.6589165	0.25	**2.64**	0.025	**26.36**
Thallium	2.5	0.000142	0.000355	0.0002	0.0061	0.00000122	1	0.02	0.017811	0.74	0.02	0.074	0.24
Uranium	482	0.000142	0.068444	24	0.0061	0.1464	1	0.02	10.7422	5	**2.15**	0.5	**21.48**
Vanadium	132	0.000142	0.018744	0.0005	0.0061	0.00000305	1	0.02	0.9373525	2.1	0.45	0.21	**4.46**
Zinc	381	0.000142	0.054102	5.48	0.0061	0.033428	1	0.02	4.3765	225	0.02	22.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 1. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.666	159.174	0.0163	13.5	0.22005	1	22	7.245184091	9.63	0.75	1.91	**3.79**
Cadmium	3.5	0.666	2.331	0.07	13.5	0.945	1	22	0.148909091	2.3	0.06	0.23	0.65
Chromium	66	0.666	43.956	0.0343	13.5	0.46305	1	22	2.019047727	56.8	0.04	5.68	0.36
Cobalt	19.9	0.666	13.2534	1.1	13.5	14.85	1	22	1.277427273	20	0.06	5	0.26
Copper	83	0.666	55.278	0.286	13.5	3.861	1	22	2.688136364	35.4	0.08	24.3	0.11
Lead	84	0.666	55.944	0.0394	13.5	0.5319	1	22	2.567086364	80	0.03	8	0.32
Manganese	5190	0.666	3456.54	120	13.5	1620	1	22	230.7518182	268	0.86	83	**2.78**
Molybdenum	31.9	0.666	21.2454	NM	13.5	N/A	1	22	0.9657	1.9	0.51	0.19	**5.08**
Nickel	44	0.666	29.304	2.43	13.5	32.805	1	22	2.823136364	42.1	0.07	23.1	0.12
Selenium	90	0.666	59.94	0.0653	13.5	0.88155	1	22	2.764615909	0.25	**11.06**	0.025	**110.58**
Thallium	2.5	0.666	1.665	0.0002	13.5	0.0027	1	22	0.075804545	0.74	0.10	0.074	**1.02**
Uranium	482	0.666	321.012	24	13.5	324	1	22	29.31872727	5	**5.86**	0.5	**58.64**
Vanadium	132	0.666	87.912	0.0005	13.5	0.00675	1	22	3.996306818	2.1	**1.90**	0.21	**19.03**
Zinc	381	0.666	253.746	5.48	13.5	73.98	1	22	14.89663636	225	0.07	22.5	0.66

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 1. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.0122	2.9158	0.0163	0.57	0.009291	1	7	0.417870143	9.63	0.04	1.91	0.22
Cadmium	3.5	0.0122	0.0427	0.07	0.57	0.0399	1	7	0.0118	2.3	0.01	0.23	0.05
Chromium	66	0.0122	0.8052	0.0343	0.57	0.019551	1	7	0.117821571	56.8	0.00	5.68	0.02
Cobalt	19.9	0.0122	0.24278	1.1	0.57	0.627	1	7	0.124254286	20	0.01	5	0.02
Copper	83	0.0122	1.0126	0.286	0.57	0.16302	1	7	0.167945714	35.4	0.00	24.3	0.01
Lead	84	0.0122	1.0248	0.0394	0.57	0.022458	1	7	0.149608286	80	0.00	8	0.02
Manganese	5190	0.0122	63.318	120	0.57	68.4	1	7	18.81685714	268	0.07	83	0.23
Molybdenum	31.9	0.0122	0.38918	NM	0.57	N/A	1	7	0.055597143	1.9	0.03	0.19	0.29
Nickel	44	0.0122	0.5368	2.43	0.57	1.3851	1	7	0.274557143	42.1	0.01	23.1	0.01
Selenium	90	0.0122	1.098	0.0653	0.57	0.037221	1	7	0.162174429	0.25	0.65	0.025	**6.49**
Thallium	2.5	0.0122	0.0305	0.0002	0.57	0.000114	1	7	0.004373429	0.74	0.01	0.074	0.06
Uranium	482	0.0122	5.8804	24	0.57	13.68	1	7	2.794342857	5	0.56	0.5	**5.59**
Vanadium	132	0.0122	1.6104	0.0005	0.57	0.000285	1	7	0.230097857	2.1	0.11	0.21	**1.10**
Zinc	381	0.0122	4.6482	5.48	0.57	3.1236	1	7	1.110257143	225	0.00	22.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 1. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.00868	2.07452	0.0163	0.329	0.0053627	1	3.8	0.547337553	9.63	0.06	1.91	0.29
Cadmium	3.5	0.00868	0.03038	0.07	0.329	0.02303	1	3.8	0.014055263	2.3	0.01	0.23	0.06
Chromium	66	0.00868	0.57288	0.0343	0.329	0.0112847	1	3.8	0.153727553	56.8	0.00	5.68	0.03
Cobalt	19.9	0.00868	0.172732	1.1	0.329	0.3619	1	3.8	0.140692632	20	0.01	5	0.03
Copper	83	0.00868	0.72044	0.286	0.329	0.094094	1	3.8	0.214351053	35.4	0.01	24.3	0.01
Lead	84	0.00868	0.72912	0.0394	0.329	0.0129626	1	3.8	0.195284895	80	0.00	8	0.02
Manganese	5190	0.00868	45.0492	120	0.329	39.48	1	3.8	22.24452632	268	0.08	83	0.27
Molybdenum	31.9	0.00868	0.276892	NM	0.329	N/A	1	3.8	0.072866316	1.9	0.04	0.19	0.38
Nickel	44	0.00868	0.38192	2.43	0.329	0.79947	1	3.8	0.310892105	42.1	0.01	23.1	0.01
Selenium	90	0.00868	0.7812	0.0653	0.329	0.0214837	1	3.8	0.211232553	0.25	0.84	0.025	**8.45**
Thallium	2.5	0.00868	0.0217	0.0002	0.329	0.0000658	1	3.8	0.005727842	0.74	0.01	0.074	0.08
Uranium	482	0.00868	4.18376	24	0.329	7.896	1	3.8	3.178884211	5	0.64	0.5	**6.36**
Vanadium	132	0.00868	1.14576	0.0005	0.329	0.0001645	1	3.8	0.301559079	2.1	0.14	0.21	**1.44**
Zinc	381	0.00868	3.30708	5.48	0.329	1.80292	1	3.8	1.344736842	225	0.01	22.5	0.06

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PI 1. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000234	0.055926	0.0163	0.00157	0.000025591	1	0.002	27.9757955	9.63	**2.91**	1.91	**14.65**
Cadmium	3.5	0.000234	0.000819	0.07	0.00157	0.0001099	1	0.002	0.46445	2.3	0.20	0.23	**2.02**
Chromium	66	0.000234	0.015444	0.0343	0.00157	0.000053851	1	0.002	7.7489255	56.8	0.14	5.68	**1.36**
Cobalt	19.9	0.000234	0.0046566	1.1	0.00157	0.001727	1	0.002	3.1918	20	0.16	5	0.64
Copper	83	0.000234	0.019422	0.286	0.00157	0.00044902	1	0.002	9.93551	35.4	0.28	24.3	0.41
Lead	84	0.000234	0.019656	0.0394	0.00157	0.000061858	1	0.002	9.858929	80	0.12	8	**1.23**
Manganese	5190	0.000234	1.21446	120	0.00157	0.1884	1	0.002	701.43	268	**2.62**	83	**8.45**
Molybdenum	31.9	0.000234	0.0074646	NM	0.00157	N/A	1	0.002	3.7323	1.9	**1.96**	0.19	**19.64**
Nickel	44	0.000234	0.010296	2.43	0.00157	0.0038151	1	0.002	7.05555	42.1	0.17	23.1	0.31
Selenium	90	0.000234	0.02106	0.0653	0.00157	0.000102521	1	0.002	10.5812605	0.25	**42.33**	0.025	**423.25**
Thallium	2.5	0.000234	0.000585	0.0002	0.00157	0.000000314	1	0.002	0.292657	0.74	0.40	0.074	**3.95**
Uranium	482	0.000234	0.112788	24	0.00157	0.03768	1	0.002	75.234	5	**15.05**	0.5	**150.47**
Vanadium	132	0.000234	0.030888	0.0005	0.00157	0.000000785	1	0.002	15.4443925	2.1	**7.35**	0.21	**73.54**
Zinc	381	0.000234	0.089154	5.48	0.00157	0.0086036	1	0.002	48.8788	225	0.22	22.5	**2.17**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 1. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000977	0.233503	0.0163	0.00378	0.000061614	1	0.009	25.95162378	9.63	**2.69**	1.91	**13.59**
Cadmium	3.5	0.000977	0.0034195	0.07	0.00378	0.0002646	1	0.009	0.409344444	2.3	0.18	0.23	**1.78**
Chromium	66	0.000977	0.064482	0.0343	0.00378	0.000129654	1	0.009	7.179072667	56.8	0.13	5.68	**1.26**
Cobalt	19.9	0.000977	0.0194423	1.1	0.00378	0.004158	1	0.009	2.622255556	20	0.13	5	0.52
Copper	83	0.000977	0.081091	0.286	0.00378	0.00108108	1	0.009	9.130231111	35.4	0.26	24.3	0.38
Lead	84	0.000977	0.082068	0.0394	0.00378	0.000148932	1	0.009	9.135214667	80	0.11	8	**1.14**
Manganese	5190	0.000977	5.07063	120	0.00378	0.4536	1	0.009	613.8033333	268	**2.29**	83	**7.40**
Molybdenum	31.9	0.000977	0.0311663	NM	0.00378	N/A	1	0.009	3.462922222	1.9	**1.82**	0.19	**18.23**
Nickel	44	0.000977	0.042988	2.43	0.00378	0.0091854	1	0.009	5.797044444	42.1	0.14	23.1	0.25
Selenium	90	0.000977	0.08793	0.0653	0.00378	0.000246834	1	0.009	9.797426	0.25	**39.19**	0.025	**391.90**
Thallium	2.5	0.000977	0.0024425	0.0002	0.00378	0.000000756	1	0.009	0.271472889	0.74	0.37	0.074	**3.67**
Uranium	482	0.000977	0.470914	24	0.00378	0.09072	1	0.009	62.40377778	5	**12.48**	0.5	**124.81**
Vanadium	132	0.000977	0.128964	0.0005	0.00378	0.00000189	1	0.009	14.32954333	2.1	**6.82**	0.21	**68.24**
Zinc	381	0.000977	0.372237	5.48	0.00378	0.0207144	1	0.009	43.66126667	225	0.19	22.5	**1.94**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 2. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000538			0.00392		1	0.0175					
Arsenic	239	0.0000538	0.0128582	0.0175	0.00392	0.0000686	1	0.0175	0.738674286	22.8	0.03	5.7	0.13
Cadmium	3.5	0.0000538	0.0001883	0.07	0.00392	0.0002744	1	0.0175	0.02644	3.4	0.01	0.85	0.03
Chromium	66	0.0000538	0.0035508	0.0326	0.00392	0.000127792	1	0.0175	0.210205257	5	0.04	1	0.21
Cobalt	19.9	0.0000538	0.00107062	1.33	0.00392	0.0052136	1	0.0175	0.359098286	43.9	0.01	23.1	0.02
Copper	83	0.0000538	0.0044654	0.384	0.00392	0.00150528	1	0.0175	0.341181714	33.2	0.01	26.9	0.01
Lead	84	0.0000538	0.0045192	0.031	0.00392	0.00012152	1	0.0175	0.265184	15	0.02	1.5	0.18
Manganese	5190	0.0000538	0.279222	142	0.00392	0.55664	1	0.0175	47.76354286	9770	0.00	977	0.05
Molybdenum	31.9	0.0000538	0.00171622	NM	0.00392	N/A	1	0.0175	0.098069714	35.5	0.00	3.55	0.03
Nickel	44	0.0000538	0.0023672	2.76	0.00392	0.0108192	1	0.0175	0.753508571	79	0.01	57.2	0.01
Selenium	90	0.0000538	0.004842	0.0717	0.00392	0.000281064	1	0.0175	0.292746514	0.8	0.37	0.4	0.73
Thallium	2.5	0.0000538	0.0001345	0.00005	0.00392	0.000000196	1	0.0175	0.007696914	1.2	0.01	0.12	0.06
Uranium	482	0.0000538	0.0259316	30	0.00392	0.1176	1	0.0175	8.201805714	1600	0.01	160	0.05
Vanadium	132	0.0000538	0.0071016	0.0005	0.00392	0.00000196	1	0.0175	0.405917714	114	0.00	11.4	0.04
Zinc	381	0.0000538	0.0204978	6	0.00392	0.02352	1	0.0175	2.515302857	223.5	0.01	10.5	0.24

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 2. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000182	0.043498	0.0175	0.003	0.0000525	1	0.0114	3.820219298	22.8	0.17	5.7	0.67
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	1	0.0114	0.074298246	3.4	0.02	0.85	0.09
Chromium	66	0.000182	0.012012	0.0326	0.003	0.0000978	1	0.0114	1.062263158	5	0.21	1	**1.06**
Cobalt	19.9	0.000182	0.0036218	1.33	0.003	0.00399	1	0.0114	0.667701754	43.9	0.02	23.1	0.03
Copper	83	0.000182	0.015106	0.384	0.003	0.001152	1	0.0114	1.426140351	33.2	0.04	26.9	0.05
Lead	84	0.000182	0.015288	0.031	0.003	0.000093	1	0.0114	1.349210526	15	0.09	1.5	0.90
Manganese	5190	0.000182	0.94458	142	0.003	0.426	1	0.0114	120.2263158	9770	0.01	977	0.12
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	1	0.0114	0.509280702	35.5	0.01	3.55	0.14
Nickel	44	0.000182	0.008008	2.76	0.003	0.00828	1	0.0114	1.42877193	79	0.02	57.2	0.02
Selenium	90	0.000182	0.01638	0.0717	0.003	0.0002151	1	0.0114	1.455710526	0.8	**1.82**	0.4	**3.64**
Thallium	2.5	0.000182	0.000455	0.00005	0.003	0.00000015	1	0.0114	0.039925439	1.2	0.03	0.12	0.33
Uranium	482	0.000182	0.087724	30	0.003	0.09	1	0.0114	15.58982456	1,600	0.01	160	0.10
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	1	0.0114	2.1075	114	0.02	11.4	0.18
Zinc	381	0.000182	0.069342	6	0.003	0.018	1	0.0114	7.661578947	223.5	0.03	10.5	0.73

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 2. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, One Food Item
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000182	0.043498	0.0175	0.003	0.0000525	1	0.0114	3.820219298	22.8	0.17	5.7	0.67
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	1	0.0114	0.074298246	3.4	0.02	0.85	0.09
Chromium	66	0.000182	0.012012	0.0326	0.003	0.0000978	1	0.0114	1.062263158	5	0.21	1	**1.06**
Cobalt	19.9	0.000182	0.0036218	1.33	0.003	0.00399	1	0.0114	0.667701754	43.9	0.02	23.1	0.03
Copper	83	0.000182	0.015106	0.384	0.003	0.001152	1	0.0114	1.426140351	33.2	0.04	26.9	0.05
Lead	84	0.000182	0.015288	0.031	0.003	0.000093	1	0.0114	1.349210526	15	0.09	1.5	0.90
Manganese	5190	0.000182	0.94458	142	0.003	0.426	1	0.0114	120.2263158	9770	0.01	977	0.12
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	1	0.0114	0.509280702	35.5	0.01	3.55	0.14
Nickel	44	0.000182	0.008008	2.76	0.003	0.00828	1	0.0114	1.42877193	79	0.02	57.2	0.02
Selenium	90	0.000182	0.01638	0.0717	0.003	0.0002151	1	0.0114	1.455710526	0.8	**1.82**	0.4	**3.64**
Thallium	2.5	0.000182	0.000455	0.00005	0.003	0.00000015	1	0.0114	0.039925439	1.2	0.03	0.12	0.33
Uranium	482	0.000182	0.087724	30	0.003	0.09	1	0.0114	15.58982456	1600	0.01	160	0.10
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	1	0.0114	2.1075	114	0.02	11.4	0.18
Zinc	381	0.000182	0.069342	6	0.003	0.018	1	0.0114	7.661578947	223.5	0.03	10.5	0.73

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 2. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00328			0.0128		1	0.103					
Arsenic	239	0.00328	0.78392	0.0175	0.0128	0.000224	1	0.103	7.613048544	22.8	0.33	5.7	**1.34**
Cadmium	3.5	0.00328	0.01148	0.07	0.0128	0.000896	1	0.103	0.12015534	3.4	0.04	0.85	0.14
Chromium	66	0.00328	0.21648	0.0326	0.0128	0.00041728	1	0.103	2.105798835	5	0.42	1	**2.11**
Cobalt	19.9	0.00328	0.065272	1.33	0.0128	0.017024	1	0.103	0.798990291	43.9	0.02	23.1	0.03
Copper	83	0.00328	0.27224	0.384	0.0128	0.0049152	1	0.103	2.690827184	33.2	0.08	26.9	0.10
Lead	84	0.00328	0.27552	0.031	0.0128	0.0003968	1	0.103	2.678803883	15	0.18	1.5	**1.79**
Manganese	5190	0.00328	17.0232	142	0.0128	1.8176	1	0.103	182.9203883	9770	0.02	977	0.19
Molybdenum	31.9	0.00328	0.104632	NM	0.0128	N/A	1	0.103	1.01584466	35.5	0.03	3.55	0.29
Nickel	44	0.00328	0.14432	2.76	0.0128	0.035328	1	0.103	1.74415534	79	0.02	57.2	0.03
Selenium	90	0.00328	0.2952	0.0717	0.0128	0.00091776	1	0.103	2.874929709	0.8	**3.59**	0.4	**7.19**
Thallium	2.5	0.00328	0.0082	0.00005	0.0128	0.00000064	1	0.103	0.079617864	1.2	0.07	0.12	0.66
Uranium	482	0.00328	1.58096	30	0.0128	0.384	1	0.103	19.07728155	1600	0.01	160	0.12
Vanadium	132	0.00328	0.43296	0.0005	0.0128	0.0000064	1	0.103	4.203557282	114	0.04	11.4	0.37
Zinc	381	0.00328	1.24968	6	0.0128	0.0768	1	0.103	12.8784466	223.5	0.06	10.5	**1.23**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 2. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.02023	4.83497	0.0175	0.046	0.000805	1	0.68	7.111433824	22.8	0.31	5.7	**1.25**
Cadmium	3.5	0.02023	0.070805	0.07	0.046	0.00322	1	0.68	0.108860294	3.4	0.03	0.85	0.13
Chromium	66	0.02023	1.33518	0.0326	0.046	0.0014996	1	0.68	1.965705294	5	0.39	1	**1.97**
Cobalt	19.9	0.02023	0.402577	1.33	0.046	0.06118	1	0.68	0.681995588	43.9	0.02	23.1	0.03
Copper	83	0.02023	1.67909	0.384	0.046	0.017664	1	0.68	2.495226471	33.2	0.08	26.9	0.09
Lead	84	0.02023	1.69932	0.031	0.046	0.001426	1	0.68	2.501097059	15	0.17	1.5	**1.67**
Manganese	5190	0.02023	104.9937	142	0.046	6.532	1	0.68	164.0083824	9770	0.02	977	0.17
Molybdenum	31.9	0.02023	0.645337	NM	0.046	N/A	1	0.68	0.949025	35.5	0.03	3.55	0.27
Nickel	44	0.02023	0.89012	2.76	0.046	0.12696	1	0.68	1.495705882	79	0.02	57.2	0.03
Selenium	90	0.02023	1.8207	0.0717	0.046	0.0032982	1	0.68	2.682350294	0.8	**3.35**	0.4	**6.71**
Thallium	2.5	0.02023	0.050575	0.00005	0.046	0.0000023	1	0.68	0.074378382	1.2	0.06	0.12	0.62
Uranium	482	0.02023	9.75086	30	0.046	1.38	1	0.68	16.36891176	1600	0.01	160	0.10
Vanadium	132	0.02023	2.67036	0.0005	0.046	0.000023	1	0.68	3.927033824	114	0.03	11.4	0.34
Zinc	381	0.02023	7.70763	6	0.046	0.276	1	0.68	11.74063235	223.5	0.05	10.5	**1.12**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 2. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00189			0.035		1	0.45					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.00189	0.45171	0.0175	0.035	0.0006125	1	0.45	1.005161111	22.8	0.04	5.7	0.18
Cadmium	3.5	0.00189	0.006615	0.07	0.035	0.00245	1	0.45	0.020144444	3.4	0.01	0.85	0.02
Chromium	66	0.00189	0.12474	0.0326	0.035	0.001141	1	0.45	0.279735556	5	0.06	1	0.28
Cobalt	19.9	0.00189	0.037611	1.33	0.035	0.04655	1	0.45	0.187024444	43.9	0.00	23.1	0.01
Copper	83	0.00189	0.15687	0.384	0.035	0.01344	1	0.45	0.378466667	33.2	0.01	26.9	0.01
Lead	84	0.00189	0.15876	0.031	0.035	0.001085	1	0.45	0.355211111	15	0.02	1.5	0.24
Manganese	5190	0.00189	9.8091	142	0.035	4.97	1	0.45	32.84244444	9770	0.00	977	0.03
Molybdenum	31.9	0.00189	0.060291	NM	0.035	N/A	1	0.45	0.13398	35.5	0.00	3.55	0.04
Nickel	44	0.00189	0.08316	2.76	0.035	0.0966	1	0.45	0.399466667	79	0.01	57.2	0.01
Selenium	90	0.00189	0.1701	0.0717	0.035	0.0025095	1	0.45	0.383576667	0.8	0.48	0.4	0.96
Thallium	2.5	0.00189	0.004725	0.00005	0.035	0.00000175	1	0.45	0.010503889	1.2	0.01	0.12	0.09
Uranium	482	0.00189	0.91098	30	0.035	1.05	1	0.45	4.357733333	1600	0.00	160	0.03
Vanadium	132	0.00189	0.24948	0.0005	0.035	0.0000175	1	0.45	0.554438889	114	0.00	11.4	0.05
Zinc	381	0.00189	0.72009	6	0.035	0.21	1	0.45	2.066866667	223.5	0.01	10.5	0.20

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 2. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000724	0.173036	0.0175	0.0085	0.00014875	1	0.055	3.148813636	22.8	0.14	5.7	0.55
Cadmium	3.5	0.000724	0.002534	0.07	0.0085	0.000595	1	0.055	0.056890909	3.4	0.02	0.85	0.07
Chromium	66	0.000724	0.047784	0.0326	0.0085	0.0002771	1	0.055	0.873838182	5	0.17	1	0.87
Cobalt	19.9	0.000724	0.0144076	1.33	0.0085	0.011305	1	0.055	0.467501818	43.9	0.01	23.1	0.02
Copper	83	0.000724	0.060092	0.384	0.0085	0.003264	1	0.055	1.151927273	33.2	0.03	26.9	0.04
Lead	84	0.000724	0.060816	0.031	0.0085	0.0002635	1	0.055	1.110536364	15	0.07	1.5	0.74
Manganese	5190	0.000724	3.75756	142	0.0085	1.207	1	0.055	90.26472727	9770	0.01	977	0.09
Molybdenum	31.9	0.000724	0.0230956	NM	0.0085	N/A	1	0.055	0.41992	35.5	0.01	3.55	0.12
Nickel	44	0.000724	0.031856	2.76	0.0085	0.02346	1	0.055	1.005745455	79	0.01	57.2	0.02
Selenium	90	0.000724	0.06516	0.0717	0.0085	0.00060945	1	0.055	1.195808182	0.8	**1.49**	0.4	**2.99**
Thallium	2.5	0.000724	0.00181	0.00005	0.0085	0.000000425	1	0.055	0.032916818	1.2	0.03	0.12	0.27
Uranium	482	0.000724	0.348968	30	0.0085	0.255	1	0.055	10.98123636	1600	0.01	160	0.07
Vanadium	132	0.000724	0.095568	0.0005	0.0085	0.00000425	1	0.055	1.737677273	114	0.02	11.4	0.15
Zinc	381	0.000724	0.275844	6	0.0085	0.051	1	0.055	5.942618182	223.5	0.03	10.5	0.57

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 2. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000142	0.033938	0.0175	0.0061	0.00010675	1	0.02	1.7022375	9.63	0.18	1.91	0.89
Cadmium	3.5	0.000142	0.000497	0.07	0.0061	0.000427	1	0.02	0.0462	2.3	0.02	0.23	0.20
Chromium	66	0.000142	0.009372	0.0326	0.0061	0.00019886	1	0.02	0.478543	56.8	0.01	5.68	0.08
Cobalt	19.9	0.000142	0.0028258	1.33	0.0061	0.008113	1	0.02	0.54694	20	0.03	5	0.11
Copper	83	0.000142	0.011786	0.384	0.0061	0.0023424	1	0.02	0.70642	35.4	0.02	24.3	0.03
Lead	84	0.000142	0.011928	0.031	0.0061	0.0001891	1	0.02	0.605855	80	0.01	8	0.08
Manganese	5190	0.000142	0.73698	142	0.0061	0.8662	1	0.02	80.159	268	0.30	83	0.97
Molybdenum	31.9	0.000142	0.0045298	NM	0.0061	N/A	1	0.02	0.22649	1.9	0.12	0.19	**1.19**
Nickel	44	0.000142	0.006248	2.76	0.0061	0.016836	1	0.02	1.1542	42.1	0.03	23.1	0.05
Selenium	90	0.000142	0.01278	0.0717	0.0061	0.00043737	1	0.02	0.6608685	0.25	**2.64**	0.025	**26.43**
Thallium	2.5	0.000142	0.000355	0.00005	0.0061	0.000000305	1	0.02	0.01776525	0.74	0.02	0.074	0.24
Uranium	482	0.000142	0.068444	30	0.0061	0.183	1	0.02	12.5722	5	**2.51**	0.5	**25.14**
Vanadium	132	0.000142	0.018744	0.0005	0.0061	0.00000305	1	0.02	0.9373525	2.1	0.45	0.21	**4.46**
Zinc	381	0.000142	0.054102	6	0.0061	0.0366	1	0.02	4.5351	225	0.02	22.5	0.20

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PB 2. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.666	159.174	0.0175	13.5	0.23625	1	22	7.245920455	9.63	0.75	1.91	**3.79**
Cadmium	3.5	0.666	2.331	0.07	13.5	0.945	1	22	0.148909091	2.3	0.06	0.23	0.65
Chromium	66	0.666	43.956	0.0326	13.5	0.4401	1	22	2.018004545	56.8	0.04	5.68	0.36
Cobalt	19.9	0.666	13.2534	1.33	13.5	17.955	1	22	1.418563636	20	0.07	5	0.28
Copper	83	0.666	55.278	0.384	13.5	5.184	1	22	2.748272727	35.4	0.08	24.3	0.11
Lead	84	0.666	55.944	0.031	13.5	0.4185	1	22	2.561931818	80	0.03	8	0.32
Manganese	5190	0.666	3456.54	142	13.5	1917	1	22	244.2518182	268	0.91	83	**2.94**
Molybdenum	31.9	0.666	21.2454	NM	13.5	N/A	1	22	0.9657	1.9	0.51	0.19	**5.08**
Nickel	44	0.666	29.304	2.76	13.5	37.26	1	22	3.025636364	42.1	0.07	23.1	0.13
Selenium	90	0.666	59.94	0.0717	13.5	0.96795	1	22	2.768543182	0.25	**11.07**	0.025	**110.74**
Thallium	2.5	0.666	1.665	0.00005	13.5	0.000675	1	22	0.0757125	0.74	0.10	0.074	**1.02**
Uranium	482	0.666	321.012	30	13.5	405	1	22	33.00054545	5	**6.60**	0.5	**66.00**
Vanadium	132	0.666	87.912	0.0005	13.5	0.00675	1	22	3.996306818	2.1	**1.90**	0.21	**19.03**
Zinc	381	0.666	253.746	6	13.5	81	1	22	15.21572727	225	0.07	22.5	0.68

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 2. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.0122	2.9158	0.0175	0.57	0.009975	1	7	0.417967857	9.63	0.04	1.91	0.22
Cadmium	3.5	0.0122	0.0427	0.07	0.57	0.0399	1	7	0.0118	2.3	0.01	0.23	0.05
Chromium	66	0.0122	0.8052	0.0326	0.57	0.018582	1	7	0.117683143	56.8	0.00	5.68	0.02
Cobalt	19.9	0.0122	0.24278	1.33	0.57	0.7581	1	7	0.142982857	20	0.01	5	0.03
Copper	83	0.0122	1.0126	0.384	0.57	0.21888	1	7	0.175925714	35.4	0.00	24.3	0.01
Lead	84	0.0122	1.0248	0.031	0.57	0.01767	1	7	0.148924286	80	0.00	8	0.02
Manganese	5190	0.0122	63.318	142	0.57	80.94	1	7	20.60828571	268	0.08	83	0.25
Molybdenum	31.9	0.0122	0.38918	NM	0.57	N/A	1	7	0.055597143	1.9	0.03	0.19	0.29
Nickel	44	0.0122	0.5368	2.76	0.57	1.5732	1	7	0.301428571	42.1	0.01	23.1	0.01
Selenium	90	0.0122	1.098	0.0717	0.57	0.040869	1	7	0.162695571	0.25	0.65	0.025	**6.51**
Thallium	2.5	0.0122	0.0305	0.00005	0.57	0.0000285	1	7	0.004361214	0.74	0.01	0.074	0.06
Uranium	482	0.0122	5.8804	30	0.57	17.1	1	7	3.282914286	5	0.66	0.5	**6.57**
Vanadium	132	0.0122	1.6104	0.0005	0.57	0.000285	1	7	0.230097857	2.1	0.11	0.21	**1.10**
Zinc	381	0.0122	4.6482	6	0.57	3.42	1	7	1.1526	225	0.01	22.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 2. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.00868	2.07452	0.0175	0.329	0.0057575	1	3.8	0.547441447	9.63	0.06	1.91	0.29
Cadmium	3.5	0.00868	0.03038	0.07	0.329	0.02303	1	3.8	0.014055263	2.3	0.01	0.23	0.06
Chromium	66	0.00868	0.57288	0.0326	0.329	0.0107254	1	3.8	0.153580368	56.8	0.00	5.68	0.03
Cobalt	19.9	0.00868	0.172732	1.33	0.329	0.43757	1	3.8	0.160605789	20	0.01	5	0.03
Copper	83	0.00868	0.72044	0.384	0.329	0.126336	1	3.8	0.222835789	35.4	0.01	24.3	0.01
Lead	84	0.00868	0.72912	0.031	0.329	0.010199	1	3.8	0.194557632	80	0.00	8	0.02
Manganese	5190	0.00868	45.0492	142	0.329	46.718	1	3.8	24.14926316	268	0.09	83	0.29
Molybdenum	31.9	0.00868	0.276892	NM	0.329	N/A	1	3.8	0.072866316	1.9	0.04	0.19	0.38
Nickel	44	0.00868	0.38192	2.76	0.329	0.90804	1	3.8	0.339463158	42.1	0.01	23.1	0.01
Selenium	90	0.00868	0.7812	0.0717	0.329	0.0235893	1	3.8	0.211786658	0.25	0.85	0.025	**8.47**
Thallium	2.5	0.00868	0.0217	0.00005	0.329	0.00001645	1	3.8	0.005714855	0.74	0.01	0.074	0.08
Uranium	482	0.00868	4.18376	30	0.329	9.87	1	3.8	3.698357895	5	0.74	0.5	**7.40**
Vanadium	132	0.00868	1.14576	0.0005	0.329	0.0001645	1	3.8	0.301559079	2.1	0.14	0.21	**1.44**
Zinc	381	0.00868	3.30708	6	0.329	1.974	1	3.8	1.389757895	225	0.01	22.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 2. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000234	0.055926	0.0175	0.00157	0.000027475	1	0.002	27.9767375	9.63	**2.91**	1.91	**14.65**
Cadmium	3.5	0.000234	0.000819	0.07	0.00157	0.0001099	1	0.002	0.46445	2.3	0.20	0.23	**2.02**
Chromium	66	0.000234	0.015444	0.0326	0.00157	0.000051182	1	0.002	7.747591	56.8	0.14	5.68	**1.36**
Cobalt	19.9	0.000234	0.0046566	1.33	0.00157	0.0020881	1	0.002	3.37235	20	0.17	5	0.67
Copper	83	0.000234	0.019422	0.384	0.00157	0.00060288	1	0.002	10.01244	35.4	0.28	24.3	0.41
Lead	84	0.000234	0.019656	0.031	0.00157	0.00004867	1	0.002	9.852335	80	0.12	8	**1.23**
Manganese	5190	0.000234	1.21446	142	0.00157	0.22294	1	0.002	718.7	268	**2.68**	83	**8.66**
Molybdenum	31.9	0.000234	0.0074646	NM	0.00157	N/A	1	0.002	3.7323	1.9	**1.96**	0.19	**19.64**
Nickel	44	0.000234	0.010296	2.76	0.00157	0.0043332	1	0.002	7.3146	42.1	0.17	23.1	0.32
Selenium	90	0.000234	0.02106	0.0717	0.00157	0.000112569	1	0.002	10.5862845	0.25	**42.35**	0.025	**423.45**
Thallium	2.5	0.000234	0.000585	0.00005	0.00157	7.85E-08	1	0.002	0.29253925	0.74	0.40	0.074	**3.95**
Uranium	482	0.000234	0.112788	30	0.00157	0.0471	1	0.002	79.944	5	**15.99**	0.5	**159.89**
Vanadium	132	0.000234	0.030888	0.0005	0.00157	0.000000785	1	0.002	15.4443925	2.1	**7.35**	0.21	**73.54**
Zinc	381	0.000234	0.089154	6	0.00157	0.00942	1	0.002	49.287	225	0.22	22.5	**2.19**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 2. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000977	0.233503	0.0175	0.00378	0.00006615	1	0.009	25.95212778	9.63	**2.69**	1.91	**13.59**
Cadmium	3.5	0.000977	0.0034195	0.07	0.00378	0.0002646	1	0.009	0.409344444	2.3	0.18	0.23	**1.78**
Chromium	66	0.000977	0.064482	0.0326	0.00378	0.000123228	1	0.009	7.178358667	56.8	0.13	5.68	**1.26**
Cobalt	19.9	0.000977	0.0194423	1.33	0.00378	0.0050274	1	0.009	2.718855556	20	0.14	5	0.54
Copper	83	0.000977	0.081091	0.384	0.00378	0.00145152	1	0.009	9.171391111	35.4	0.26	24.3	0.38
Lead	84	0.000977	0.082068	0.031	0.00378	0.00011718	1	0.009	9.131686667	80	0.11	8	**1.14**
Manganese	5190	0.000977	5.07063	142	0.00378	0.53676	1	0.009	623.0433333	268	**2.32**	83	**7.51**
Molybdenum	31.9	0.000977	0.0311663	NM	0.00378	N/A	1	0.009	3.462922222	1.9	**1.82**	0.19	**18.23**
Nickel	44	0.000977	0.042988	2.76	0.00378	0.0104328	1	0.009	5.935644444	42.1	0.14	23.1	0.26
Selenium	90	0.000977	0.08793	0.0717	0.00378	0.000271026	1	0.009	9.800114	0.25	**39.20**	0.025	**392.00**
Thallium	2.5	0.000977	0.0024425	0.00005	0.00378	0.000000189	1	0.009	0.271409889	0.74	0.37	0.074	**3.67**
Uranium	482	0.000977	0.470914	30	0.00378	0.1134	1	0.009	64.92377778	5	**12.98**	0.5	**129.85**
Vanadium	132	0.000977	0.128964	0.0005	0.00378	0.00000189	1	0.009	14.32954333	2.1	**6.82**	0.21	**68.24**
Zinc	381	0.000977	0.372237	6	0.00378	0.02268	1	0.009	43.87966667	225	0.20	22.5	**1.95**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 3. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000538			0.00392		1	0.0175					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.0000538	0.0027169	0.0093	0.00392	0.000036456	1	0.0175	0.157334629	22.8	0.01	5.7	0.03
Cadmium	0.8	0.0000538	0.00004304	0.0044	0.00392	0.000017248	1	0.0175	0.003445029	3.4	0.00	0.85	0.00
Chromium	29.1	0.0000538	0.00156558	0.0169	0.00392	0.000066248	1	0.0175	0.093247314	5	0.02	1	0.09
Cobalt	15.7	0.0000538	0.00084466	0.0024	0.00392	0.000009408	1	0.0175	0.048803886	43.9	0.00	23.1	0.00
Copper	32.2	0.0000538	0.00173236	0.051	0.00392	0.00019992	1	0.0175	0.110416	33.2	0.00	26.9	0.00
Lead	27.1	0.0000538	0.00145798	0.0059	0.00392	0.000023128	1	0.0175	0.084634743	15	0.01	1.5	0.06
Manganese	1990	0.0000538	0.107062	15.9	0.00392	0.062328	1	0.0175	9.679428571	9770	0.00	977	0.01
Molybdenum	1.6	0.0000538	0.00008608	NM	0.00392	N/A	1	0.0175	0.004918857	35.5	0.00	3.55	0.00
Nickel	21.7	0.0000538	0.00116746	0.32	0.00392	0.0012544	1	0.0175	0.138392	79	0.00	57.2	0.00
Selenium	0.085	0.0000538	0.000004573	0.0005	0.00392	0.00000196	1	0.0175	0.000373314	0.8	0.00	0.4	0.00
Thallium	0.2	0.0000538	0.00001076	0.0015	0.00392	0.00000588	1	0.0175	0.000950857	1.2	0.00	0.12	0.01
Uranium	15.3	0.0000538	0.00082314	0.13	0.00392	0.0005096	1	0.0175	0.076156571	1600	0.00	160	0.00
Vanadium	49.6	0.0000538	0.00266848	0.0082	0.00392	0.000032144	1	0.0175	0.154321371	114	0.00	11.4	0.01
Zinc	116	0.0000538	0.0062408	0.38	0.00392	0.0014896	1	0.0175	0.441737143	223.5	0.00	10.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 3. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000182	0.009191	0.0093	0.003	0.0000279	1	0.0114	0.808675439	22.8	0.04	5.7	0.14
Cadmium	0.8	0.000182	0.0001456	0.0044	0.003	0.0000132	1	0.0114	0.013929825	3.4	0.00	0.85	0.02
Chromium	29.1	0.000182	0.0052962	0.0169	0.003	0.0000507	1	0.0114	0.469026316	5	0.09	1	0.47
Cobalt	15.7	0.000182	0.0028574	0.0024	0.003	0.0000072	1	0.0114	0.251280702	43.9	0.01	23.1	0.01
Copper	32.2	0.000182	0.0058604	0.051	0.003	0.000153	1	0.0114	0.527491228	33.2	0.02	26.9	0.02
Lead	27.1	0.000182	0.0049322	0.0059	0.003	0.0000177	1	0.0114	0.434201754	15	0.03	1.5	0.29
Manganese	1990	0.000182	0.36218	15.9	0.003	0.0477	1	0.0114	35.95438596	9770	0.00	977	0.04
Molybdenum	1.6	0.000182	0.0002912	NM	0.003	N/A	1	0.0114	0.02554386	35.5	0.00	3.55	0.01
Nickel	21.7	0.000182	0.0039494	0.32	0.003	0.00096	1	0.0114	0.430649123	79	0.01	57.2	0.01
Selenium	0.085	0.000182	0.00001547	0.0005	0.003	0.0000015	1	0.0114	0.001488596	0.8	0.00	0.4	0.00
Thallium	0.2	0.000182	0.0000364	0.0015	0.003	0.0000045	1	0.0114	0.003587719	1.2	0.00	0.12	0.03
Uranium	15.3	0.000182	0.0027846	0.13	0.003	0.00039	1	0.0114	0.278473684	1,600	0.00	160	0.00
Vanadium	49.6	0.000182	0.0090272	0.0082	0.003	0.0000246	1	0.0114	0.794017544	114	0.01	11.4	0.07
Zinc	116	0.000182	0.021112	0.38	0.003	0.00114	1	0.0114	1.951929825	223.5	0.01	10.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 3. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, One Food Item
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000182	0.009191	0.0093	0.003	0.0000279	1	0.0114	0.808675439	22.8	0.04	5.7	0.14
Cadmium	0.8	0.000182	0.0001456	0.0044	0.003	0.0000132	1	0.0114	0.013929825	3.4	0.00	0.85	0.02
Chromium	29.1	0.000182	0.0052962	0.0169	0.003	0.0000507	1	0.0114	0.469026316	5	0.09	1	0.47
Cobalt	15.7	0.000182	0.0028574	0.0024	0.003	0.0000072	1	0.0114	0.251280702	43.9	0.01	23.1	0.01
Copper	32.2	0.000182	0.0058604	0.051	0.003	0.000153	1	0.0114	0.527491228	33.2	0.02	26.9	0.02
Lead	27.1	0.000182	0.0049322	0.0059	0.003	0.0000177	1	0.0114	0.434201754	15	0.03	1.5	0.29
Manganese	1990	0.000182	0.36218	15.9	0.003	0.0477	1	0.0114	35.95438596	9770	0.00	977	0.04
Molybdenum	1.6	0.000182	0.0002912	NM	0.003	N/A	1	0.0114	0.02554386	35.5	0.00	3.55	0.01
Nickel	21.7	0.000182	0.0039494	0.32	0.003	0.00096	1	0.0114	0.430649123	79	0.01	57.2	0.01
Selenium	0.085	0.000182	0.00001547	0.0005	0.003	0.0000015	1	0.0114	0.001488596	0.8	0.00	0.4	0.00
Thallium	0.2	0.000182	0.0000364	0.0015	0.003	0.0000045	1	0.0114	0.003587719	1.2	0.00	0.12	0.03
Uranium	15.3	0.000182	0.0027846	0.13	0.003	0.00039	1	0.0114	0.278473684	1600	0.00	160	0.00
Vanadium	49.6	0.000182	0.0090272	0.0082	0.003	0.0000246	1	0.0114	0.794017544	114	0.01	11.4	0.07
Zinc	116	0.000182	0.021112	0.38	0.003	0.00114	1	0.0114	1.951929825	223.5	0.01	10.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 3. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00328			0.0128		1	0.103					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.00328	0.16564	0.0093	0.0128	0.00011904	1	0.103	1.609311068	22.8	0.07	5.7	0.28
Cadmium	0.8	0.00328	0.002624	0.0044	0.0128	0.00005632	1	0.103	0.026022524	3.4	0.01	0.85	0.03
Chromium	29.1	0.00328	0.095448	0.0169	0.0128	0.00021632	1	0.103	0.928779806	5	0.19	1	0.93
Cobalt	15.7	0.00328	0.051496	0.0024	0.0128	0.00003072	1	0.103	0.500259417	43.9	0.01	23.1	0.02
Copper	32.2	0.00328	0.105616	0.051	0.0128	0.0006528	1	0.103	1.031735922	33.2	0.03	26.9	0.04
Lead	27.1	0.00328	0.088888	0.0059	0.0128	0.00007552	1	0.103	0.863723495	15	0.06	1.5	0.58
Manganese	1990	0.00328	6.5272	15.9	0.0128	0.20352	1	0.103	65.34679612	9770	0.01	977	0.07
Molybdenum	1.6	0.00328	0.005248	NM	0.0128	N/A	1	0.103	0.050951456	35.5	0.00	3.55	0.01
Nickel	21.7	0.00328	0.071176	0.32	0.0128	0.004096	1	0.103	0.730796117	79	0.01	57.2	0.01
Selenium	0.085	0.00328	0.0002788	0.0005	0.0128	0.0000064	1	0.103	0.002768932	0.8	0.00	0.4	0.01
Thallium	0.2	0.00328	0.000656	0.0015	0.0128	0.0000192	1	0.103	0.00655534	1.2	0.01	0.12	0.05
Uranium	15.3	0.00328	0.050184	0.13	0.0128	0.001664	1	0.103	0.503378641	1600	0.00	160	0.00
Vanadium	49.6	0.00328	0.162688	0.0082	0.0128	0.00010496	1	0.103	1.580514175	114	0.01	11.4	0.14
Zinc	116	0.00328	0.38048	0.38	0.0128	0.004864	1	0.103	3.741203883	223.5	0.02	10.5	0.36

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 3. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.02023	1.021615	0.0093	0.046	0.0004278	1	0.68	1.503004118	22.8	0.07	5.7	0.26
Cadmium	0.8	0.02023	0.016184	0.0044	0.046	0.0002024	1	0.68	0.024097647	3.4	0.01	0.85	0.03
Chromium	29.1	0.02023	0.588693	0.0169	0.046	0.0007774	1	0.68	0.866868235	5	0.17	1	0.87
Cobalt	15.7	0.02023	0.317611	0.0024	0.046	0.0001104	1	0.68	0.467237353	43.9	0.01	23.1	0.02
Copper	32.2	0.02023	0.651406	0.051	0.046	0.002346	1	0.68	0.9614	33.2	0.03	26.9	0.04
Lead	27.1	0.02023	0.548233	0.0059	0.046	0.0002714	1	0.68	0.806624118	15	0.05	1.5	0.54
Manganese	1990	0.02023	40.2577	15.9	0.046	0.7314	1	0.68	60.27808824	9770	0.01	977	0.06
Molybdenum	1.6	0.02023	0.032368	NM	0.046	N/A	1	0.68	0.0476	35.5	0.00	3.55	0.01
Nickel	21.7	0.02023	0.438991	0.32	0.046	0.01472	1	0.68	0.667222059	79	0.01	57.2	0.01
Selenium	0.085	0.02023	0.00171955	0.0005	0.046	0.000023	1	0.68	0.002562574	0.8	0.00	0.4	0.01
Thallium	0.2	0.02023	0.004046	0.0015	0.046	0.000069	1	0.68	0.006051471	1.2	0.01	0.12	0.05
Uranium	15.3	0.02023	0.309519	0.13	0.046	0.00598	1	0.68	0.463969118	1600	0.00	160	0.00
Vanadium	49.6	0.02023	1.003408	0.0082	0.046	0.0003772	1	0.68	1.476154706	114	0.01	11.4	0.13
Zinc	116	0.02023	2.34668	0.38	0.046	0.01748	1	0.68	3.476705882	223.5	0.02	10.5	0.33

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PS 3. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035		1	0.45					
Arsenic	50.5	0.00189	0.095445	0.0093	0.035	0.0003255	1	0.45	0.212823333	22.8	0.01	5.7	0.04
Cadmium	0.8	0.00189	0.001512	0.0044	0.035	0.000154	1	0.45	0.003702222	3.4	0.00	0.85	0.00
Chromium	29.1	0.00189	0.054999	0.0169	0.035	0.0005915	1	0.45	0.123534444	5	0.02	1	0.12
Cobalt	15.7	0.00189	0.029673	0.0024	0.035	0.000084	1	0.45	0.066126667	43.9	0.00	23.1	0.00
Copper	32.2	0.00189	0.060858	0.051	0.035	0.001785	1	0.45	0.139206667	33.2	0.00	26.9	0.01
Lead	27.1	0.00189	0.051219	0.0059	0.035	0.0002065	1	0.45	0.114278889	15	0.01	1.5	0.08
Manganese	1990	0.00189	3.7611	15.9	0.035	0.5565	1	0.45	9.594666667	9770	0.00	977	0.01
Molybdenum	1.6	0.00189	0.003024	NM	0.035	N/A	1	0.45	0.00672	35.5	0.00	3.55	0.00
Nickel	21.7	0.00189	0.041013	0.32	0.035	0.0112	1	0.45	0.116028889	79	0.00	57.2	0.00
Selenium	0.085	0.00189	0.00016065	0.0005	0.035	0.0000175	1	0.45	0.000395889	0.8	0.00	0.4	0.00
Thallium	0.2	0.00189	0.000378	0.0015	0.035	0.0000525	1	0.45	0.000956667	1.2	0.00	0.12	0.01
Uranium	15.3	0.00189	0.028917	0.13	0.035	0.00455	1	0.45	0.074371111	1600	0.00	160	0.00
Vanadium	49.6	0.00189	0.093744	0.0082	0.035	0.000287	1	0.45	0.208957778	114	0.00	11.4	0.02
Zinc	116	0.00189	0.21924	0.38	0.035	0.0133	1	0.45	0.516755556	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 3. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000724	0.036562	0.0093	0.0085	0.00007905	1	0.055	0.666200909	22.8	0.03	5.7	0.12
Cadmium	0.8	0.000724	0.0005792	0.0044	0.0085	0.0000374	1	0.055	0.011210909	3.4	0.00	0.85	0.01
Chromium	29.1	0.000724	0.0210684	0.0169	0.0085	0.00014365	1	0.055	0.385673636	5	0.08	1	0.39
Cobalt	15.7	0.000724	0.0113668	0.0024	0.0085	0.0000204	1	0.055	0.20704	43.9	0.00	23.1	0.01
Copper	32.2	0.000724	0.0233128	0.051	0.0085	0.0004335	1	0.055	0.431750909	33.2	0.01	26.9	0.02
Lead	27.1	0.000724	0.0196204	0.0059	0.0085	0.00005015	1	0.055	0.357646364	15	0.02	1.5	0.24
Manganese	1990	0.000724	1.44076	15.9	0.0085	0.13515	1	0.055	28.65290909	9770	0.00	977	0.03
Molybdenum	1.6	0.000724	0.0011584	NM	0.0085	N/A	1	0.055	0.021061818	35.5	0.00	3.55	0.01
Nickel	21.7	0.000724	0.0157108	0.32	0.0085	0.00272	1	0.055	0.335105455	79	0.00	57.2	0.01
Selenium	0.085	0.000724	0.00006154	0.0005	0.0085	0.00000425	1	0.055	0.001196182	0.8	0.00	0.4	0.00
Thallium	0.2	0.000724	0.0001448	0.0015	0.0085	0.00001275	1	0.055	0.002864545	1.2	0.00	0.12	0.02
Uranium	15.3	0.000724	0.0110772	0.13	0.0085	0.001105	1	0.055	0.221494545	1600	0.00	160	0.00
Vanadium	49.6	0.000724	0.0359104	0.0082	0.0085	0.0000697	1	0.055	0.654183636	114	0.01	11.4	0.06
Zinc	116	0.000724	0.083984	0.38	0.0085	0.00323	1	0.055	1.585709091	223.5	0.01	10.5	0.15

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 3. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000142	0.007171	0.0093	0.0061	0.00005673	1	0.02	0.3613865	9.63	0.04	1.91	0.19
Cadmium	0.8	0.000142	0.0001136	0.0044	0.0061	0.00002684	1	0.02	0.007022	2.3	0.00	0.23	0.03
Chromium	29.1	0.000142	0.0041322	0.0169	0.0061	0.00010309	1	0.02	0.2117645	56.8	0.00	5.68	0.04
Cobalt	15.7	0.000142	0.0022294	0.0024	0.0061	0.00001464	1	0.02	0.112202	20	0.01	5	0.02
Copper	32.2	0.000142	0.0045724	0.051	0.0061	0.0003111	1	0.02	0.244175	35.4	0.01	24.3	0.01
Lead	27.1	0.000142	0.0038482	0.0059	0.0061	0.00003599	1	0.02	0.1942095	80	0.00	8	0.02
Manganese	1990	0.000142	0.28258	15.9	0.0061	0.09699	1	0.02	18.9785	268	0.07	83	0.23
Molybdenum	1.6	0.000142	0.0002272	NM	0.0061	N/A	1	0.02	0.01136	1.9	0.01	0.19	0.06
Nickel	21.7	0.000142	0.0030814	0.32	0.0061	0.001952	1	0.02	0.25167	42.1	0.01	23.1	0.01
Selenium	0.085	0.000142	0.00001207	0.0005	0.0061	0.00000305	1	0.02	0.000756	0.25	0.00	0.025	0.03
Thallium	0.2	0.000142	0.0000284	0.0015	0.0061	0.00000915	1	0.02	0.0018775	0.74	0.00	0.074	0.03
Uranium	15.3	0.000142	0.0021726	0.13	0.0061	0.000793	1	0.02	0.14828	5	0.03	0.5	0.30
Vanadium	49.6	0.000142	0.0070432	0.0082	0.0061	0.00005002	1	0.02	0.354661	2.1	0.17	0.21	**1.69**
Zinc	116	0.000142	0.016472	0.38	0.0061	0.002318	1	0.02	0.9395	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 3. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.666	33.633	0.0093	13.5	0.12555	1	22	1.534479545	9.63	0.16	1.91	0.80
Cadmium	0.8	0.666	0.5328	0.0044	13.5	0.0594	1	22	0.026918182	2.3	0.01	0.23	0.12
Chromium	29.1	0.666	19.3806	0.0169	13.5	0.22815	1	22	0.891306818	56.8	0.02	5.68	0.16
Cobalt	15.7	0.666	10.4562	0.0024	13.5	0.0324	1	22	0.476754545	20	0.02	5	0.10
Copper	32.2	0.666	21.4452	0.051	13.5	0.6885	1	22	1.006077273	35.4	0.03	24.3	0.04
Lead	27.1	0.666	18.0486	0.0059	13.5	0.07965	1	22	0.824011364	80	0.01	8	0.10
Manganese	1990	0.666	1325.34	15.9	13.5	214.65	1	22	69.99954545	268	0.26	83	0.84
Molybdenum	1.6	0.666	1.0656	NM	13.5	N/A	1	22	0.048436364	1.9	0.03	0.19	0.25
Nickel	21.7	0.666	14.4522	0.32	13.5	4.32	1	22	0.853281818	42.1	0.02	23.1	0.04
Selenium	0.085	0.666	0.05661	0.0005	13.5	0.00675	1	22	0.00288	0.25	0.01	0.025	0.12
Thallium	0.2	0.666	0.1332	0.0015	13.5	0.02025	1	22	0.006975	0.74	0.01	0.074	0.09
Uranium	15.3	0.666	10.1898	0.13	13.5	1.755	1	22	0.542945455	5	0.11	0.5	**1.09**
Vanadium	49.6	0.666	33.0336	0.0082	13.5	0.1107	1	22	1.506559091	2.1	0.72	0.21	**7.17**
Zinc	116	0.666	77.256	0.38	13.5	5.13	1	22	3.744818182	225	0.02	22.5	0.17

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 3. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.0122	0.6161	0.0093	0.57	0.005301	1	7	0.088771571	9.63	0.01	1.91	0.05
Cadmium	0.8	0.0122	0.00976	0.0044	0.57	0.002508	1	7	0.001752571	2.3	0.00	0.23	0.01
Chromium	29.1	0.0122	0.35502	0.0169	0.57	0.009633	1	7	0.052093286	56.8	0.00	5.68	0.01
Cobalt	15.7	0.0122	0.19154	0.0024	0.57	0.001368	1	7	0.027558286	20	0.00	5	0.01
Copper	32.2	0.0122	0.39284	0.051	0.57	0.02907	1	7	0.060272857	35.4	0.00	24.3	0.00
Lead	27.1	0.0122	0.33062	0.0059	0.57	0.003363	1	7	0.047711857	80	0.00	8	0.01
Manganese	1990	0.0122	24.278	15.9	0.57	9.063	1	7	4.763	268	0.02	83	0.06
Molybdenum	1.6	0.0122	0.01952	NM	0.57	N/A	1	7	0.002788571	1.9	0.00	0.19	0.01
Nickel	21.7	0.0122	0.26474	0.32	0.57	0.1824	1	7	0.063877143	42.1	0.00	23.1	0.00
Selenium	0.085	0.0122	0.001037	0.0005	0.57	0.000285	1	7	0.000188857	0.25	0.00	0.025	0.01
Thallium	0.2	0.0122	0.00244	0.0015	0.57	0.000855	1	7	0.000470714	0.74	0.00	0.074	0.01
Uranium	15.3	0.0122	0.18666	0.13	0.57	0.0741	1	7	0.037251429	5	0.01	0.5	0.07
Vanadium	49.6	0.0122	0.60512	0.0082	0.57	0.004674	1	7	0.087113429	2.1	0.04	0.21	0.41
Zinc	116	0.0122	1.4152	0.38	0.57	0.2166	1	7	0.233114286	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 3. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.00868	0.43834	0.0093	0.329	0.0030597	1	3.8	0.116157816	9.63	0.01	1.91	0.06
Cadmium	0.8	0.00868	0.006944	0.0044	0.329	0.0014476	1	3.8	0.002208316	2.3	0.00	0.23	0.01
Chromium	29.1	0.00868	0.252588	0.0169	0.329	0.0055601	1	3.8	0.067933711	56.8	0.00	5.68	0.01
Cobalt	15.7	0.00868	0.136276	0.0024	0.329	0.0007896	1	3.8	0.036069895	20	0.00	5	0.01
Copper	32.2	0.00868	0.279496	0.051	0.329	0.016779	1	3.8	0.077967105	35.4	0.00	24.3	0.00
Lead	27.1	0.00868	0.235228	0.0059	0.329	0.0019411	1	3.8	0.062412921	80	0.00	8	0.01
Manganese	1990	0.00868	17.2732	15.9	0.329	5.2311	1	3.8	5.922184211	268	0.02	83	0.07
Molybdenum	1.6	0.00868	0.013888	NM	0.329	N/A	1	3.8	0.003654737	1.9	0.00	0.19	0.02
Nickel	21.7	0.00868	0.188356	0.32	0.329	0.10528	1	3.8	0.077272632	42.1	0.00	23.1	0.00
Selenium	0.085	0.00868	0.0007378	0.0005	0.329	0.0001645	1	3.8	0.000237447	0.25	0.00	0.025	0.01
Thallium	0.2	0.00868	0.001736	0.0015	0.329	0.0004935	1	3.8	0.000586711	0.74	0.00	0.074	0.01
Uranium	15.3	0.00868	0.132804	0.13	0.329	0.04277	1	3.8	0.046203684	5	0.01	0.5	0.09
Vanadium	49.6	0.00868	0.430528	0.0082	0.329	0.0026978	1	3.8	0.114006789	2.1	0.05	0.21	0.54
Zinc	116	0.00868	1.00688	0.38	0.329	0.12502	1	3.8	0.297868421	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 3. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000234	0.011817	0.0093	0.00157	0.000014601	1	0.002	5.9158005	9.63	0.61	1.91	**3.10**
Cadmium	0.8	0.000234	0.0001872	0.0044	0.00157	0.000006908	1	0.002	0.097054	2.3	0.04	0.23	0.42
Chromium	29.1	0.000234	0.0068094	0.0169	0.00157	0.000026533	1	0.002	3.4179665	56.8	0.06	5.68	0.60
Cobalt	15.7	0.000234	0.0036738	0.0024	0.00157	0.000003768	1	0.002	1.838784	20	0.09	5	0.37
Copper	32.2	0.000234	0.0075348	0.051	0.00157	0.00008007	1	0.002	3.807435	35.4	0.11	24.3	0.16
Lead	27.1	0.000234	0.0063414	0.0059	0.00157	0.000009263	1	0.002	3.1753315	80	0.04	8	0.40
Manganese	1990	0.000234	0.46566	15.9	0.00157	0.024963	1	0.002	245.3115	268	0.92	83	**2.96**
Molybdenum	1.6	0.000234	0.0003744	NM	0.00157	N/A	1	0.002	0.1872	1.9	0.10	0.19	0.99
Nickel	21.7	0.000234	0.0050778	0.32	0.00157	0.0005024	1	0.002	2.7901	42.1	0.07	23.1	0.12
Selenium	0.085	0.000234	0.00001989	0.0005	0.00157	0.000000785	1	0.002	0.0103375	0.25	0.04	0.025	0.41
Thallium	0.2	0.000234	0.0000468	0.0015	0.00157	0.000002355	1	0.002	0.0245775	0.74	0.03	0.074	0.33
Uranium	15.3	0.000234	0.0035802	0.13	0.00157	0.0002041	1	0.002	1.89215	5	0.38	0.5	**3.78**
Vanadium	49.6	0.000234	0.0116064	0.0082	0.00157	0.000012874	1	0.002	5.809637	2.1	**2.77**	0.21	**27.66**
Zinc	116	0.000234	0.027144	0.38	0.00157	0.0005966	1	0.002	13.8703	225	0.06	22.5	0.62

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 3. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000977	0.0493385	0.0093	0.00378	0.000035154	1	0.009	5.485961556	9.63	0.57	1.91	**2.87**
Cadmium	0.8	0.000977	0.0007816	0.0044	0.00378	0.000016632	1	0.009	0.088692444	2.3	0.04	0.23	0.39
Chromium	29.1	0.000977	0.0284307	0.0169	0.00378	0.000063882	1	0.009	3.166064667	56.8	0.06	5.68	0.56
Cobalt	15.7	0.000977	0.0153389	0.0024	0.00378	0.000009072	1	0.009	1.705330222	20	0.09	5	0.34
Copper	32.2	0.000977	0.0314594	0.051	0.00378	0.00019278	1	0.009	3.516908889	35.4	0.10	24.3	0.14
Lead	27.1	0.000977	0.0264767	0.0059	0.00378	0.000022302	1	0.009	2.944333556	80	0.04	8	0.37
Manganese	1990	0.000977	1.94423	15.9	0.00378	0.060102	1	0.009	222.7035556	268	0.83	83	**2.68**
Molybdenum	1.6	0.000977	0.0015632	NM	0.00378	N/A	1	0.009	0.173688889	1.9	0.09	0.19	0.91
Nickel	21.7	0.000977	0.0212009	0.32	0.00378	0.0012096	1	0.009	2.490055556	42.1	0.06	23.1	0.11
Selenium	0.085	0.000977	0.000083045	0.0005	0.00378	0.00000189	1	0.009	0.009437222	0.25	0.04	0.025	0.38
Thallium	0.2	0.000977	0.0001954	0.0015	0.00378	0.00000567	1	0.009	0.022341111	0.74	0.03	0.074	0.30
Uranium	15.3	0.000977	0.0149481	0.13	0.00378	0.0004914	1	0.009	1.7155	5	0.34	0.5	**3.43**
Vanadium	49.6	0.000977	0.0484592	0.0082	0.00378	0.000030996	1	0.009	5.387799556	2.1	**2.57**	0.21	**25.66**
Zinc	116	0.000977	0.113332	0.38	0.00378	0.0014364	1	0.009	12.75204444	225	0.06	22.5	0.57

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 4. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000538			0.00392		1	0.0175					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.0000538	0.0002959	0.0007	0.00392	0.000002744	1	0.0175	0.017065371	22.8	0.00	5.7	0.00
Cadmium	0.36	0.0000538	0.000019368	0.053	0.00392	0.00020776	1	0.0175	0.012978743	3.4	0.00	0.85	0.02
Chromium	13.9	0.0000538	0.00074782	0.0081	0.00392	0.000031752	1	0.0175	0.044546971	5	0.01	1	0.04
Cobalt	8.3	0.0000538	0.00044654	0.06	0.00392	0.0002352	1	0.0175	0.038956571	43.9	0.00	23.1	0.00
Copper	15.4	0.0000538	0.00082852	0.08	0.00392	0.0003136	1	0.0175	0.065264	33.2	0.00	26.9	0.00
Lead	16.1	0.0000538	0.00086618	0.0001	0.00392	0.000000392	1	0.0175	0.0495184	15	0.00	1.5	0.03
Manganese	623	0.0000538	0.0335174	91.2	0.00392	0.357504	1	0.0175	22.34408	9770	0.00	977	0.02
Molybdenum	1.8	0.0000538	0.00009684	NM	0.00392	N/A	1	0.0175	0.005533714	35.5	0.00	3.55	0.00
Nickel	12.3	0.0000538	0.00066174	1.38	0.00392	0.0054096	1	0.0175	0.346933714	79	0.00	57.2	0.01
Selenium	0.76	0.0000538	0.000040888	0.0005	0.00392	0.00000196	1	0.0175	0.002448457	0.8	0.00	0.4	0.01
Thallium	0.17	0.0000538	0.000009146	0.00005	0.00392	0.000000196	1	0.0175	0.000533829	1.2	0.00	0.12	0.00
Uranium	15.5	0.0000538	0.0008339	0.727	0.00392	0.00284984	1	0.0175	0.210499429	1600	0.00	160	0.00
Vanadium	27.9	0.0000538	0.00150102	0.00051	0.00392	1.9992E-06	1	0.0175	0.085886811	114	0.00	11.4	0.01
Zinc	58.1	0.0000538	0.00312578	3	0.00392	0.01176	1	0.0175	0.850616	223.5	0.00	10.5	0.08

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 4. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000182	0.001001	0.0007	0.003	0.0000021	1	0.0114	0.087991228	22.8	0.00	5.7	0.02
Cadmium	0.36	0.000182	0.00006552	0.053	0.003	0.000159	1	0.0114	0.019694737	3.4	0.01	0.85	0.02
Chromium	13.9	0.000182	0.0025298	0.0081	0.003	0.0000243	1	0.0114	0.22404386	5	0.04	1	0.22
Cobalt	8.3	0.000182	0.0015106	0.06	0.003	0.00018	1	0.0114	0.148298246	43.9	0.00	23.1	0.01
Copper	15.4	0.000182	0.0028028	0.08	0.003	0.00024	1	0.0114	0.266912281	33.2	0.01	26.9	0.01
Lead	16.1	0.000182	0.0029302	0.0001	0.003	0.0000003	1	0.0114	0.257061404	15	0.02	1.5	0.17
Manganese	623	0.000182	0.113386	91.2	0.003	0.2736	1	0.0114	33.94614035	9770	0.00	977	0.03
Molybdenum	1.8	0.000182	0.0003276	NM	0.003	N/A	1	0.0114	0.028736842	35.5	0.00	3.55	0.01
Nickel	12.3	0.000182	0.0022386	1.38	0.003	0.00414	1	0.0114	0.559526316	79	0.01	57.2	0.01
Selenium	0.76	0.000182	0.00013832	0.0005	0.003	0.0000015	1	0.0114	0.012264912	0.8	0.02	0.4	0.03
Thallium	0.17	0.000182	0.00003094	0.00005	0.003	0.00000015	1	0.0114	0.002727193	1.2	0.00	0.12	0.02
Uranium	15.5	0.000182	0.002821	0.727	0.003	0.002181	1	0.0114	0.43877193	1,600	0.00	160	0.00
Vanadium	27.9	0.000182	0.0050778	0.00051	0.003	0.00000153	1	0.0114	0.445555263	114	0.00	11.4	0.04
Zinc	58.1	0.000182	0.0105742	3	0.003	0.009	1	0.0114	1.717035088	223.5	0.01	10.5	0.16

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 4. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, One Food Item
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000182	0.001001	0.0007	0.003	0.0000021	1	0.0114	0.087991228	22.8	0.00	5.7	0.02
Cadmium	0.36	0.000182	0.00006552	0.053	0.003	0.000159	1	0.0114	0.019694737	3.4	0.01	0.85	0.02
Chromium	13.9	0.000182	0.0025298	0.0081	0.003	0.0000243	1	0.0114	0.22404386	5	0.04	1	0.22
Cobalt	8.3	0.000182	0.0015106	0.06	0.003	0.00018	1	0.0114	0.148298246	43.9	0.00	23.1	0.01
Copper	15.4	0.000182	0.0028028	0.08	0.003	0.00024	1	0.0114	0.266912281	33.2	0.01	26.9	0.01
Lead	16.1	0.000182	0.0029302	0.0001	0.003	0.0000003	1	0.0114	0.257061404	15	0.02	1.5	0.17
Manganese	623	0.000182	0.113386	91.2	0.003	0.2736	1	0.0114	33.94614035	9770	0.00	977	0.03
Molybdenum	1.8	0.000182	0.0003276	NM	0.003	N/A	1	0.0114	0.028736842	35.5	0.00	3.55	0.01
Nickel	12.3	0.000182	0.0022386	1.38	0.003	0.00414	1	0.0114	0.559526316	79	0.01	57.2	0.01
Selenium	0.76	0.000182	0.00013832	0.0005	0.003	0.0000015	1	0.0114	0.012264912	0.8	0.02	0.4	0.03
Thallium	0.17	0.000182	0.00003094	0.00005	0.003	0.00000015	1	0.0114	0.002727193	1.2	0.00	0.12	0.02
Uranium	15.5	0.000182	0.002821	0.727	0.003	0.002181	1	0.0114	0.43877193	1600	0.00	160	0.00
Vanadium	27.9	0.000182	0.0050778	0.00051	0.003	0.00000153	1	0.0114	0.445555263	114	0.00	11.4	0.04
Zinc	58.1	0.000182	0.0105742	3	0.003	0.009	1	0.0114	1.717035088	223.5	0.01	10.5	0.16

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PP 4. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00328			0.0128		1	0.103					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.00328	0.01804	0.0007	0.0128	0.00000896	1	0.103	0.175232621	22.8	0.01	5.7	0.03
Cadmium	0.36	0.00328	0.0011808	0.053	0.0128	0.0006784	1	0.103	0.018050485	3.4	0.01	0.85	0.02
Chromium	13.9	0.00328	0.045592	0.0081	0.0128	0.00010368	1	0.103	0.443647379	5	0.09	1	0.44
Cobalt	8.3	0.00328	0.027224	0.06	0.0128	0.000768	1	0.103	0.27176699	43.9	0.01	23.1	0.01
Copper	15.4	0.00328	0.050512	0.08	0.0128	0.001024	1	0.103	0.500349515	33.2	0.02	26.9	0.02
Lead	16.1	0.00328	0.052808	0.0001	0.0128	0.00000128	1	0.103	0.512711456	15	0.03	1.5	0.34
Manganese	623	0.00328	2.04344	91.2	0.0128	1.16736	1	0.103	31.17281553	9770	0.00	977	0.03
Molybdenum	1.8	0.00328	0.005904	NM	0.0128	N/A	1	0.103	0.057320388	35.5	0.00	3.55	0.02
Nickel	12.3	0.00328	0.040344	1.38	0.0128	0.017664	1	0.103	0.563184466	79	0.01	57.2	0.01
Selenium	0.76	0.00328	0.0024928	0.0005	0.0128	0.0000064	1	0.103	0.024264078	0.8	0.03	0.4	0.06
Thallium	0.17	0.00328	0.0005576	0.00005	0.0128	0.00000064	1	0.103	0.005419806	1.2	0.00	0.12	0.05
Uranium	15.5	0.00328	0.05084	0.727	0.0128	0.0093056	1	0.103	0.583937864	1600	0.00	160	0.00
Vanadium	27.9	0.00328	0.091512	0.00051	0.0128	0.000006528	1	0.103	0.888529398	114	0.01	11.4	0.08
Zinc	58.1	0.00328	0.190568	3	0.0128	0.0384	1	0.103	2.222990291	223.5	0.01	10.5	0.21

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 4. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.02023	0.111265	0.0007	0.046	0.0000322	1	0.68	0.163672353	22.8	0.01	5.7	0.03
Cadmium	0.36	0.02023	0.0072828	0.053	0.046	0.002438	1	0.68	0.014295294	3.4	0.00	0.85	0.02
Chromium	13.9	0.02023	0.281197	0.0081	0.046	0.0003726	1	0.68	0.414072941	5	0.08	1	0.41
Cobalt	8.3	0.02023	0.167909	0.06	0.046	0.00276	1	0.68	0.250983824	43.9	0.01	23.1	0.01
Copper	15.4	0.02023	0.311542	0.08	0.046	0.00368	1	0.68	0.463561765	33.2	0.01	26.9	0.02
Lead	16.1	0.02023	0.325703	0.0001	0.046	0.0000046	1	0.68	0.478981765	15	0.03	1.5	0.32
Manganese	623	0.02023	12.60329	91.2	0.046	4.1952	1	0.68	24.70366176	9770	0.00	977	0.03
Molybdenum	1.8	0.02023	0.036414	NM	0.046	N/A	1	0.68	0.05355	35.5	0.00	3.55	0.02
Nickel	12.3	0.02023	0.248829	1.38	0.046	0.06348	1	0.68	0.459277941	79	0.01	57.2	0.01
Selenium	0.76	0.02023	0.0153748	0.0005	0.046	0.000023	1	0.68	0.022643824	0.8	0.03	0.4	0.06
Thallium	0.17	0.02023	0.0034391	0.00005	0.046	0.0000023	1	0.68	0.005060882	1.2	0.00	0.12	0.04
Uranium	15.5	0.02023	0.313565	0.727	0.046	0.033442	1	0.68	0.510304412	1600	0.00	160	0.00
Vanadium	27.9	0.02023	0.564417	0.00051	0.046	0.00002346	1	0.68	0.8300595	114	0.01	11.4	0.07
Zinc	58.1	0.02023	1.175363	3	0.046	0.138	1	0.68	1.931416176	223.5	0.01	10.5	0.18

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 4. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00189			0.035		1	0.45					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.00189	0.010395	0.0007	0.035	0.0000245	1	0.45	0.023154444	22.8	0.00	5.7	0.00
Cadmium	0.36	0.00189	0.0006804	0.053	0.035	0.001855	1	0.45	0.005634222	3.4	0.00	0.85	0.01
Chromium	13.9	0.00189	0.026271	0.0081	0.035	0.0002835	1	0.45	0.05901	5	0.01	1	0.06
Cobalt	8.3	0.00189	0.015687	0.06	0.035	0.0021	1	0.45	0.039526667	43.9	0.00	23.1	0.00
Copper	15.4	0.00189	0.029106	0.08	0.035	0.0028	1	0.45	0.070902222	33.2	0.00	26.9	0.00
Lead	16.1	0.00189	0.030429	0.0001	0.035	0.0000035	1	0.45	0.067627778	15	0.00	1.5	0.05
Manganese	623	0.00189	1.17747	91.2	0.035	3.192	1	0.45	9.709933333	9770	0.00	977	0.01
Molybdenum	1.8	0.00189	0.003402	NM	0.035	N/A	1	0.45	0.00756	35.5	0.00	3.55	0.00
Nickel	12.3	0.00189	0.023247	1.38	0.035	0.0483	1	0.45	0.158993333	79	0.00	57.2	0.00
Selenium	0.76	0.00189	0.0014364	0.0005	0.035	0.0000175	1	0.45	0.003230889	0.8	0.00	0.4	0.01
Thallium	0.17	0.00189	0.0003213	0.00005	0.035	0.00000175	1	0.45	0.000717889	1.2	0.00	0.12	0.01
Uranium	15.5	0.00189	0.029295	0.727	0.035	0.025445	1	0.45	0.121644444	1600	0.00	160	0.00
Vanadium	27.9	0.00189	0.052731	0.00051	0.035	0.00001785	1	0.45	0.117219667	114	0.00	11.4	0.01
Zinc	58.1	0.00189	0.109809	3	0.035	0.105	1	0.45	0.477353333	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 4. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000724	0.003982	0.0007	0.0085	0.00000595	1	0.055	0.072508182	22.8	0.00	5.7	0.01
Cadmium	0.36	0.000724	0.00026064	0.053	0.0085	0.0004505	1	0.055	0.012929818	3.4	0.00	0.85	0.02
Chromium	13.9	0.000724	0.0100636	0.0081	0.0085	0.00006885	1	0.055	0.184226364	5	0.04	1	0.18
Cobalt	8.3	0.000724	0.0060092	0.06	0.0085	0.00051	1	0.055	0.118530909	43.9	0.00	23.1	0.01
Copper	15.4	0.000724	0.0111496	0.08	0.0085	0.00068	1	0.055	0.215083636	33.2	0.01	26.9	0.01
Lead	16.1	0.000724	0.0116564	0.0001	0.0085	0.00000085	1	0.055	0.21195	15	0.01	1.5	0.14
Manganese	623	0.000724	0.451052	91.2	0.0085	0.7752	1	0.055	22.29549091	9770	0.00	977	0.02
Molybdenum	1.8	0.000724	0.0013032	NM	0.0085	N/A	1	0.055	0.023694545	35.5	0.00	3.55	0.01
Nickel	12.3	0.000724	0.0089052	1.38	0.0085	0.01173	1	0.055	0.375185455	79	0.00	57.2	0.01
Selenium	0.76	0.000724	0.00055024	0.0005	0.0085	0.00000425	1	0.055	0.010081636	0.8	0.01	0.4	0.03
Thallium	0.17	0.000724	0.00012308	0.00005	0.0085	0.000000425	1	0.055	0.002245545	1.2	0.00	0.12	0.02
Uranium	15.5	0.000724	0.011222	0.727	0.0085	0.0061795	1	0.055	0.316390909	1600	0.00	160	0.00
Vanadium	27.9	0.000724	0.0201996	0.00051	0.0085	0.000004335	1	0.055	0.367344273	114	0.00	11.4	0.03
Zinc	58.1	0.000724	0.0420644	3	0.0085	0.0255	1	0.055	1.228443636	223.5	0.01	10.5	0.12

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 4. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000142	0.000781	0.0007	0.0061	0.00000427	1	0.02	0.0392635	9.63	0.00	1.91	0.02
Cadmium	0.36	0.000142	0.00005112	0.053	0.0061	0.0003233	1	0.02	0.018721	2.3	0.01	0.23	0.08
Chromium	13.9	0.000142	0.0019738	0.0081	0.0061	0.00004941	1	0.02	0.1011605	56.8	0.00	5.68	0.02
Cobalt	8.3	0.000142	0.0011786	0.06	0.0061	0.000366	1	0.02	0.07723	20	0.00	5	0.02
Copper	15.4	0.000142	0.0021868	0.08	0.0061	0.000488	1	0.02	0.13374	35.4	0.00	24.3	0.01
Lead	16.1	0.000142	0.0022862	0.0001	0.0061	0.00000061	1	0.02	0.1143405	80	0.00	8	0.01
Manganese	623	0.000142	0.088466	91.2	0.0061	0.55632	1	0.02	32.2393	268	0.12	83	0.39
Molybdenum	1.8	0.000142	0.0002556	NM	0.0061	N/A	1	0.02	0.01278	1.9	0.01	0.19	0.07
Nickel	12.3	0.000142	0.0017466	1.38	0.0061	0.008418	1	0.02	0.50823	42.1	0.01	23.1	0.02
Selenium	0.76	0.000142	0.00010792	0.0005	0.0061	0.00000305	1	0.02	0.0055485	0.25	0.02	0.025	0.22
Thallium	0.17	0.000142	0.00002414	0.00005	0.0061	0.000000305	1	0.02	0.00122225	0.74	0.00	0.074	0.02
Uranium	15.5	0.000142	0.002201	0.727	0.0061	0.0044347	1	0.02	0.331785	5	0.07	0.5	0.66
Vanadium	27.9	0.000142	0.0039618	0.00051	0.0061	0.000003111	1	0.02	0.19824555	2.1	0.09	0.21	0.94
Zinc	58.1	0.000142	0.0082502	3	0.0061	0.0183	1	0.02	1.32751	225	0.01	22.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 4. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.666	3.663	0.0007	13.5	0.00945	1	22	0.166929545	9.63	0.02	1.91	0.09
Cadmium	0.36	0.666	0.23976	0.053	13.5	0.7155	1	22	0.043420909	2.3	0.02	0.23	0.19
Chromium	13.9	0.666	9.2574	0.0081	13.5	0.10935	1	22	0.425761364	56.8	0.01	5.68	0.07
Cobalt	8.3	0.666	5.5278	0.06	13.5	0.81	1	22	0.288081818	20	0.01	5	0.06
Copper	15.4	0.666	10.2564	0.08	13.5	1.08	1	22	0.515290909	35.4	0.01	24.3	0.02
Lead	16.1	0.666	10.7226	0.0001	13.5	0.00135	1	22	0.487452273	80	0.01	8	0.06
Manganese	623	0.666	414.918	91.2	13.5	1231.2	1	22	74.82354545	268	0.28	83	0.90
Molybdenum	1.8	0.666	1.1988	NM	13.5	N/A	1	22	0.054490909	1.9	0.03	0.19	0.29
Nickel	12.3	0.666	8.1918	1.38	13.5	18.63	1	22	1.219172727	42.1	0.03	23.1	0.05
Selenium	0.76	0.666	0.50616	0.0005	13.5	0.00675	1	22	0.023314091	0.25	0.09	0.025	0.93
Thallium	0.17	0.666	0.11322	0.00005	13.5	0.000675	1	22	0.005177045	0.74	0.01	0.074	0.07
Uranium	15.5	0.666	10.323	0.727	13.5	9.8145	1	22	0.915340909	5	0.18	0.5	**1.83**
Vanadium	27.9	0.666	18.5814	0.00051	13.5	0.006885	1	22	0.844922045	2.1	0.40	0.21	**4.02**
Zinc	58.1	0.666	38.6946	3	13.5	40.5	1	22	3.599754545	225	0.02	22.5	0.16

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 4. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.0122	0.0671	0.0007	0.57	0.000399	1	7	0.009642714	9.63	0.00	1.91	0.01
Cadmium	0.36	0.0122	0.004392	0.053	0.57	0.03021	1	7	0.004943143	2.3	0.00	0.23	0.02
Chromium	13.9	0.0122	0.16958	0.0081	0.57	0.004617	1	7	0.024885286	56.8	0.00	5.68	0.00
Cobalt	8.3	0.0122	0.10126	0.06	0.57	0.0342	1	7	0.019351429	20	0.00	5	0.00
Copper	15.4	0.0122	0.18788	0.08	0.57	0.0456	1	7	0.033354286	35.4	0.00	24.3	0.00
Lead	16.1	0.0122	0.19642	0.0001	0.57	0.000057	1	7	0.028068143	80	0.00	8	0.00
Manganese	623	0.0122	7.6006	91.2	0.57	51.984	1	7	8.512085714	268	0.03	83	0.10
Molybdenum	1.8	0.0122	0.02196	NM	0.57	N/A	1	7	0.003137143	1.9	0.00	0.19	0.02
Nickel	12.3	0.0122	0.15006	1.38	0.57	0.7866	1	7	0.133808571	42.1	0.00	23.1	0.01
Selenium	0.76	0.0122	0.009272	0.0005	0.57	0.000285	1	7	0.001365286	0.25	0.01	0.025	0.05
Thallium	0.17	0.0122	0.002074	0.00005	0.57	0.0000285	1	7	0.000300357	0.74	0.00	0.074	0.00
Uranium	15.5	0.0122	0.1891	0.727	0.57	0.41439	1	7	0.086212857	5	0.02	0.5	0.17
Vanadium	27.9	0.0122	0.34038	0.00051	0.57	0.0002907	1	7	0.048667243	2.1	0.02	0.21	0.23
Zinc	58.1	0.0122	0.70882	3	0.57	1.71	1	7	0.345545714	225	0.00	22.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 4. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.00868	0.04774	0.0007	0.329	0.0002303	1	3.8	0.012623763	9.63	0.00	1.91	0.01
Cadmium	0.36	0.00868	0.0031248	0.053	0.329	0.017437	1	3.8	0.005411	2.3	0.00	0.23	0.02
Chromium	13.9	0.00868	0.120652	0.0081	0.329	0.0026649	1	3.8	0.032451816	56.8	0.00	5.68	0.01
Cobalt	8.3	0.00868	0.072044	0.06	0.329	0.01974	1	3.8	0.024153684	20	0.00	5	0.00
Copper	15.4	0.00868	0.133672	0.08	0.329	0.02632	1	3.8	0.042103158	35.4	0.00	24.3	0.00
Lead	16.1	0.00868	0.139748	0.0001	0.329	0.0000329	1	3.8	0.036784447	80	0.00	8	0.00
Manganese	623	0.00868	5.40764	91.2	0.329	30.0048	1	3.8	9.319063158	268	0.03	83	0.11
Molybdenum	1.8	0.00868	0.015624	NM	0.329	N/A	1	3.8	0.004111579	1.9	0.00	0.19	0.02
Nickel	12.3	0.00868	0.106764	1.38	0.329	0.45402	1	3.8	0.147574737	42.1	0.00	23.1	0.01
Selenium	0.76	0.00868	0.0065968	0.0005	0.329	0.0001645	1	3.8	0.001779289	0.25	0.01	0.025	0.07
Thallium	0.17	0.00868	0.0014756	0.00005	0.329	0.00001645	1	3.8	0.000392645	0.74	0.00	0.074	0.01
Uranium	15.5	0.00868	0.13454	0.727	0.329	0.239183	1	3.8	0.098348158	5	0.02	0.5	0.20
Vanadium	27.9	0.00868	0.242172	0.00051	0.329	0.00016779	1	3.8	0.063773629	2.1	0.03	0.21	0.30
Zinc	58.1	0.00868	0.504308	3	0.329	0.987	1	3.8	0.392449474	225	0.00	22.5	0.02

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PI 4. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000234	0.001287	0.0007	0.00157	0.000001099	1	0.002	0.6440495	9.63	0.07	1.91	0.34
Cadmium	0.36	0.000234	0.00008424	0.053	0.00157	0.00008321	1	0.002	0.083725	2.3	0.04	0.23	0.36
Chromium	13.9	0.000234	0.0032526	0.0081	0.00157	0.000012717	1	0.002	1.6326585	56.8	0.03	5.68	0.29
Cobalt	8.3	0.000234	0.0019422	0.06	0.00157	0.0000942	1	0.002	1.0182	20	0.05	5	0.20
Copper	15.4	0.000234	0.0036036	0.08	0.00157	0.0001256	1	0.002	1.8646	35.4	0.05	24.3	0.08
Lead	16.1	0.000234	0.0037674	0.0001	0.00157	0.000000157	1	0.002	1.8837785	80	0.02	8	0.24
Manganese	623	0.000234	0.145782	91.2	0.00157	0.143184	1	0.002	144.483	268	0.54	83	**1.74**
Molybdenum	1.8	0.000234	0.0004212	NM	0.00157	N/A	1	0.002	0.2106	1.9	0.11	0.19	**1.11**
Nickel	12.3	0.000234	0.0028782	1.38	0.00157	0.0021666	1	0.002	2.5224	42.1	0.06	23.1	0.11
Selenium	0.76	0.000234	0.00017784	0.0005	0.00157	0.000000785	1	0.002	0.0893125	0.25	0.36	0.025	**3.57**
Thallium	0.17	0.000234	0.00003978	0.00005	0.00157	7.85E-08	1	0.002	0.01992925	0.74	0.03	0.074	0.27
Uranium	15.5	0.000234	0.003627	0.727	0.00157	0.00114139	1	0.002	2.384195	5	0.48	0.5	**4.77**
Vanadium	27.9	0.000234	0.0065286	0.00051	0.00157	8.007E-07	1	0.002	3.26470035	2.1	**1.55**	0.21	**15.55**
Zinc	58.1	0.000234	0.0135954	3	0.00157	0.00471	1	0.002	9.1527	225	0.04	22.5	0.41

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 4. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000977			0.00378		1	0.009					
Arsenic	5.5	0.000977	0.0053735	0.0007	0.00378	0.000002646	1	0.009	0.597349556	9.63	0.06	1.91	0.31
Cadmium	0.36	0.000977	0.00035172	0.053	0.00378	0.00020034	1	0.009	0.06134	2.3	0.03	0.23	0.27
Chromium	13.9	0.000977	0.0135803	0.0081	0.00378	0.000030618	1	0.009	1.512324222	56.8	0.03	5.68	0.27
Cobalt	8.3	0.000977	0.0081091	0.06	0.00378	0.0002268	1	0.009	0.926211111	20	0.05	5	0.19
Copper	15.4	0.000977	0.0150458	0.08	0.00378	0.0003024	1	0.009	1.705355556	35.4	0.05	24.3	0.07
Lead	16.1	0.000977	0.0157297	0.0001	0.00378	0.000000378	1	0.009	1.747786444	80	0.02	8	0.22
Manganese	623	0.000977	0.608671	91.2	0.00378	0.344736	1	0.009	105.9341111	268	0.40	83	**1.28**
Molybdenum	1.8	0.000977	0.0017586	NM	0.00378	N/A	1	0.009	0.1954	1.9	0.10	0.19	**1.03**
Nickel	12.3	0.000977	0.0120171	1.38	0.00378	0.0052164	1	0.009	1.914833333	42.1	0.05	23.1	0.08
Selenium	0.76	0.000977	0.00074252	0.0005	0.00378	0.00000189	1	0.009	0.082712222	0.25	0.33	0.025	3.31
Thallium	0.17	0.000977	0.00016609	0.00005	0.00378	0.000000189	1	0.009	0.018475444	0.74	0.02	0.074	0.25
Uranium	15.5	0.000977	0.0151435	0.727	0.00378	0.00274806	1	0.009	1.987951111	5	0.40	0.5	**3.98**
Vanadium	27.9	0.000977	0.0272583	0.00051	0.00378	1.9278E-06	1	0.009	3.0289142	2.1	**1.44**	0.21	**14.42**
Zinc	58.1	0.000977	0.0567637	3	0.00378	0.01134	1	0.009	7.567077778	225	0.03	22.5	0.34

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 6. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000538			0.00392		1	0.0175					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.0000538	0.001614	0.003	0.00392	0.00001176	1	0.0175	0.092900571	22.8	0.00	5.7	0.02
Cadmium	0.72	0.0000538	0.000038736	0.005	0.00392	0.0000196	1	0.0175	0.003333486	3.4	0.00	0.85	0.00
Chromium	14	0.0000538	0.0007532	0.01	0.00392	0.0000392	1	0.0175	0.04528	5	0.01	1	0.05
Cobalt	7.4	0.0000538	0.00039812	0.0019	0.00392	0.000007448	1	0.0175	0.023175314	43.9	0.00	23.1	0.00
Copper	52.2	0.0000538	0.00280836	0.06	0.00392	0.0002352	1	0.0175	0.173917714	33.2	0.01	26.9	0.01
Lead	16.3	0.0000538	0.00087694	0.0025	0.00392	0.0000098	1	0.0175	0.050670857	15	0.00	1.5	0.03
Manganese	1100	0.0000538	0.05918	15.9	0.00392	0.062328	1	0.0175	6.943314286	9770	0.00	977	0.01
Molybdenum	7.4	0.0000538	0.00039812	NM	0.00392	N/A	1	0.0175	0.022749714	35.5	0.00	3.55	0.01
Nickel	11.8	0.0000538	0.00063484	0.4	0.00392	0.001568	1	0.0175	0.125876571	79	0.00	57.2	0.00
Selenium	0.085	0.0000538	0.000004573	0.001	0.00392	0.00000392	1	0.0175	0.000485314	0.8	0.00	0.4	0.00
Thallium	0.49	0.0000538	0.000026362	0.0003	0.00392	0.000001176	1	0.0175	0.0015736	1.2	0.00	0.12	0.01
Uranium	262	0.0000538	0.0140956	0.103	0.00392	0.00040376	1	0.0175	0.828534857	1600	0.00	160	0.01
Vanadium	28.3	0.0000538	0.00152254	0.00025	0.00392	0.00000098	1	0.0175	0.087058286	114	0.00	11.4	0.01
Zinc	80.9	0.0000538	0.00435242	0.5	0.00392	0.00196	1	0.0175	0.360709714	223.5	0.00	10.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 6. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000182	0.00546	0.003	0.003	0.000009	1	0.0114	0.479736842	22.8	0.02	5.7	0.08
Cadmium	0.72	0.000182	0.00013104	0.005	0.003	0.000015	1	0.0114	0.012810526	3.4	0.00	0.85	0.02
Chromium	14	0.000182	0.002548	0.01	0.003	0.00003	1	0.0114	0.226140351	5	0.05	1	0.23
Cobalt	7.4	0.000182	0.0013468	0.0019	0.003	0.0000057	1	0.0114	0.118640351	43.9	0.00	23.1	0.01
Copper	52.2	0.000182	0.0095004	0.06	0.003	0.00018	1	0.0114	0.849157895	33.2	0.03	26.9	0.03
Lead	16.3	0.000182	0.0029666	0.0025	0.003	0.0000075	1	0.0114	0.260885965	15	0.02	1.5	0.17
Manganese	1100	0.000182	0.2002	15.9	0.003	0.0477	1	0.0114	21.74561404	9770	0.00	977	0.02
Molybdenum	7.4	0.000182	0.0013468	NM	0.003	N/A	1	0.0114	0.118140351	35.5	0.00	3.55	0.03
Nickel	11.8	0.000182	0.0021476	0.4	0.003	0.0012	1	0.0114	0.293649123	79	0.00	57.2	0.01
Selenium	0.085	0.000182	0.00001547	0.001	0.003	0.000003	1	0.0114	0.001620175	0.8	0.00	0.4	0.00
Thallium	0.49	0.000182	0.00008918	0.0003	0.003	0.0000009	1	0.0114	0.007901754	1.2	0.01	0.12	0.07
Uranium	262	0.000182	0.047684	0.103	0.003	0.000309	1	0.0114	4.209912281	1,600	0.00	160	0.03
Vanadium	28.3	0.000182	0.0051506	0.00025	0.003	0.00000075	1	0.0114	0.451872807	114	0.00	11.4	0.04
Zinc	80.9	0.000182	0.0147238	0.5	0.003	0.0015	1	0.0114	1.423140351	223.5	0.01	10.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 6. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, One Food Item
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000182	0.00546	0.003	0.003	0.000009	1	0.0114	0.479736842	22.8	0.02	5.7	0.08
Cadmium	0.72	0.000182	0.00013104	0.005	0.003	0.000015	1	0.0114	0.012810526	3.4	0.00	0.85	0.02
Chromium	14	0.000182	0.002548	0.01	0.003	0.00003	1	0.0114	0.226140351	5	0.05	1	0.23
Cobalt	7.4	0.000182	0.0013468	0.0019	0.003	0.0000057	1	0.0114	0.118640351	43.9	0.00	23.1	0.01
Copper	52.2	0.000182	0.0095004	0.06	0.003	0.00018	1	0.0114	0.849157895	33.2	0.03	26.9	0.03
Lead	16.3	0.000182	0.0029666	0.0025	0.003	0.0000075	1	0.0114	0.260885965	15	0.02	1.5	0.17
Manganese	1100	0.000182	0.2002	15.9	0.003	0.0477	1	0.0114	21.74561404	9770	0.00	977	0.02
Molybdenum	7.4	0.000182	0.0013468	NM	0.003	N/A	1	0.0114	0.118140351	35.5	0.00	3.55	0.03
Nickel	11.8	0.000182	0.0021476	0.4	0.003	0.0012	1	0.0114	0.293649123	79	0.00	57.2	0.01
Selenium	0.085	0.000182	0.00001547	0.001	0.003	0.000003	1	0.0114	0.001620175	0.8	0.00	0.4	0.00
Thallium	0.49	0.000182	0.00008918	0.0003	0.003	0.0000009	1	0.0114	0.007901754	1.2	0.01	0.12	0.07
Uranium	262	0.000182	0.047684	0.103	0.003	0.000309	1	0.0114	4.209912281	1600	0.00	160	0.03
Vanadium	28.3	0.000182	0.0051506	0.00025	0.003	0.00000075	1	0.0114	0.451872807	114	0.00	11.4	0.04
Zinc	80.9	0.000182	0.0147238	0.5	0.003	0.0015	1	0.0114	1.423140351	223.5	0.01	10.5	0.14

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 6. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00328			0.0128		1	0.103					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.00328	0.0984	0.003	0.0128	0.0000384	1	0.103	0.955712621	22.8	0.04	5.7	0.17
Cadmium	0.72	0.00328	0.0023616	0.005	0.0128	0.000064	1	0.103	0.023549515	3.4	0.01	0.85	0.03
Chromium	14	0.00328	0.04592	0.01	0.0128	0.000128	1	0.103	0.447067961	5	0.09	1	0.45
Cobalt	7.4	0.00328	0.024272	0.0019	0.0128	0.00002432	1	0.103	0.235886602	43.9	0.01	23.1	0.01
Copper	52.2	0.00328	0.171216	0.06	0.0128	0.000768	1	0.103	1.669747573	33.2	0.05	26.9	0.06
Lead	16.3	0.00328	0.053464	0.0025	0.0128	0.000032	1	0.103	0.519378641	15	0.03	1.5	0.35
Manganese	1100	0.00328	3.608	15.9	0.0128	0.20352	1	0.103	37.00504854	9770	0.00	977	0.04
Molybdenum	7.4	0.00328	0.024272	NM	0.0128	N/A	1	0.103	0.235650485	35.5	0.01	3.55	0.07
Nickel	11.8	0.00328	0.038704	0.4	0.0128	0.00512	1	0.103	0.425475728	79	0.01	57.2	0.01
Selenium	0.085	0.00328	0.0002788	0.001	0.0128	0.0000128	1	0.103	0.002831068	0.8	0.00	0.4	0.01
Thallium	0.49	0.00328	0.0016072	0.0003	0.0128	0.00000384	1	0.103	0.015641165	1.2	0.01	0.12	0.13
Uranium	262	0.00328	0.85936	0.103	0.0128	0.0013184	1	0.103	8.356100971	1600	0.01	160	0.05
Vanadium	28.3	0.00328	0.092824	0.00025	0.0128	0.0000032	1	0.103	0.901234951	114	0.01	11.4	0.08
Zinc	80.9	0.00328	0.265352	0.5	0.0128	0.0064	1	0.103	2.638368932	223.5	0.01	10.5	0.25

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 6. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.02023	0.6069	0.003	0.046	0.000138	1	0.68	0.892702941	22.8	0.04	5.7	0.16
Cadmium	0.72	0.02023	0.0145656	0.005	0.046	0.00023	1	0.68	0.021758235	3.4	0.01	0.85	0.03
Chromium	14	0.02023	0.28322	0.01	0.046	0.00046	1	0.68	0.417176471	5	0.08	1	0.42
Cobalt	7.4	0.02023	0.149702	0.0019	0.046	0.0000874	1	0.68	0.220278529	43.9	0.01	23.1	0.01
Copper	52.2	0.02023	1.056006	0.06	0.046	0.00276	1	0.68	1.557008824	33.2	0.05	26.9	0.06
Lead	16.3	0.02023	0.329749	0.0025	0.046	0.000115	1	0.68	0.485094118	15	0.03	1.5	0.32
Manganese	1100	0.02023	22.253	15.9	0.046	0.7314	1	0.68	33.80058824	9770	0.00	977	0.03
Molybdenum	7.4	0.02023	0.149702	NM	0.046	N/A	1	0.68	0.22015	35.5	0.01	3.55	0.06
Nickel	11.8	0.02023	0.238714	0.4	0.046	0.0184	1	0.68	0.378108824	79	0.00	57.2	0.01
Selenium	0.085	0.02023	0.00171955	0.001	0.046	0.000046	1	0.68	0.002596397	0.8	0.00	0.4	0.01
Thallium	0.49	0.02023	0.0099127	0.0003	0.046	0.0000138	1	0.68	0.014597794	1.2	0.01	0.12	0.12
Uranium	262	0.02023	5.30026	0.103	0.046	0.004738	1	0.68	7.801467647	1600	0.00	160	0.05
Vanadium	28.3	0.02023	0.572509	0.00025	0.046	0.0000115	1	0.68	0.841941912	114	0.01	11.4	0.07
Zinc	80.9	0.02023	1.636607	0.5	0.046	0.023	1	0.68	2.440598529	223.5	0.01	10.5	0.23

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 6. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00189			0.035		1	0.45					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.00189	0.0567	0.003	0.035	0.000105	1	0.45	0.126233333	22.8	0.01	5.7	0.02
Cadmium	0.72	0.00189	0.0013608	0.005	0.035	0.000175	1	0.45	0.003412889	3.4	0.00	0.85	0.00
Chromium	14	0.00189	0.02646	0.01	0.035	0.00035	1	0.45	0.059577778	5	0.01	1	0.06
Cobalt	7.4	0.00189	0.013986	0.0019	0.035	0.0000665	1	0.45	0.031227778	43.9	0.00	23.1	0.00
Copper	52.2	0.00189	0.098658	0.06	0.035	0.0021	1	0.45	0.223906667	33.2	0.01	26.9	0.01
Lead	16.3	0.00189	0.030807	0.0025	0.035	0.0000875	1	0.45	0.068654444	15	0.00	1.5	0.05
Manganese	1100	0.00189	2.079	15.9	0.035	0.5565	1	0.45	5.856666667	9770	0.00	977	0.01
Molybdenum	7.4	0.00189	0.013986	NM	0.035	N/A	1	0.45	0.03108	35.5	0.00	3.55	0.01
Nickel	11.8	0.00189	0.022302	0.4	0.035	0.014	1	0.45	0.080671111	79	0.00	57.2	0.00
Selenium	0.085	0.00189	0.00016065	0.001	0.035	0.000035	1	0.45	0.000434778	0.8	0.00	0.4	0.00
Thallium	0.49	0.00189	0.0009261	0.0003	0.035	0.0000105	1	0.45	0.002081333	1.2	0.00	0.12	0.02
Uranium	262	0.00189	0.49518	0.103	0.035	0.003605	1	0.45	1.108411111	1600	0.00	160	0.01
Vanadium	28.3	0.00189	0.053487	0.00025	0.035	0.00000875	1	0.45	0.118879444	114	0.00	11.4	0.01
Zinc	80.9	0.00189	0.152901	0.5	0.035	0.0175	1	0.45	0.378668889	223.5	0.00	10.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 6. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000724	0.02172	0.003	0.0085	0.0000255	1	0.055	0.395372727	22.8	0.02	5.7	0.07
Cadmium	0.72	0.000724	0.00052128	0.005	0.0085	0.0000425	1	0.055	0.010250545	3.4	0.00	0.85	0.01
Chromium	14	0.000724	0.010136	0.01	0.0085	0.000085	1	0.055	0.185836364	5	0.04	1	0.19
Cobalt	7.4	0.000724	0.0053576	0.0019	0.0085	0.00001615	1	0.055	0.097704545	43.9	0.00	23.1	0.00
Copper	52.2	0.000724	0.0377928	0.06	0.0085	0.00051	1	0.055	0.696414545	33.2	0.02	26.9	0.03
Lead	16.3	0.000724	0.0118012	0.0025	0.0085	0.00002125	1	0.055	0.214953636	15	0.01	1.5	0.14
Manganese	1100	0.000724	0.7964	15.9	0.0085	0.13515	1	0.055	16.93727273	9770	0.00	977	0.02
Molybdenum	7.4	0.000724	0.0053576	NM	0.0085	N/A	1	0.055	0.097410909	35.5	0.00	3.55	0.03
Nickel	11.8	0.000724	0.0085432	0.4	0.0085	0.0034	1	0.055	0.217149091	79	0.00	57.2	0.00
Selenium	0.085	0.000724	0.00006154	0.001	0.0085	0.0000085	1	0.055	0.001273455	0.8	0.00	0.4	0.00
Thallium	0.49	0.000724	0.00035476	0.0003	0.0085	0.00000255	1	0.055	0.006496545	1.2	0.01	0.12	0.05
Uranium	262	0.000724	0.189688	0.103	0.0085	0.0008755	1	0.055	3.464790909	1600	0.00	160	0.02
Vanadium	28.3	0.000724	0.0204892	0.00025	0.0085	0.000002125	1	0.055	0.372569545	114	0.00	11.4	0.03
Zinc	80.9	0.000724	0.0585716	0.5	0.0085	0.00425	1	0.055	1.142210909	223.5	0.01	10.5	0.11

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 6. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000142	0.00426	0.003	0.0061	0.0000183	1	0.02	0.213915	9.63	0.02	1.91	0.11
Cadmium	0.72	0.000142	0.00010224	0.005	0.0061	0.0000305	1	0.02	0.006637	2.3	0.00	0.23	0.03
Chromium	14	0.000142	0.001988	0.01	0.0061	0.000061	1	0.02	0.10245	56.8	0.00	5.68	0.02
Cobalt	7.4	0.000142	0.0010508	0.0019	0.0061	0.00001159	1	0.02	0.0531195	20	0.00	5	0.01
Copper	52.2	0.000142	0.0074124	0.06	0.0061	0.000366	1	0.02	0.38892	35.4	0.01	24.3	0.02
Lead	16.3	0.000142	0.0023146	0.0025	0.0061	0.00001525	1	0.02	0.1164925	80	0.00	8	0.01
Manganese	1100	0.000142	0.1562	15.9	0.0061	0.09699	1	0.02	12.6595	268	0.05	83	0.15
Molybdenum	7.4	0.000142	0.0010508	NM	0.0061	N/A	1	0.02	0.05254	1.9	0.03	0.19	0.28
Nickel	11.8	0.000142	0.0016756	0.4	0.0061	0.00244	1	0.02	0.20578	42.1	0.00	23.1	0.01
Selenium	0.085	0.000142	0.00001207	0.001	0.0061	0.0000061	1	0.02	0.0009085	0.25	0.00	0.025	0.04
Thallium	0.49	0.000142	0.00006958	0.0003	0.0061	0.00000183	1	0.02	0.0035705	0.74	0.00	0.074	0.05
Uranium	262	0.000142	0.037204	0.103	0.0061	0.0006283	1	0.02	1.891615	5	0.38	0.5	**3.78**
Vanadium	28.3	0.000142	0.0040186	0.00025	0.0061	0.000001525	1	0.02	0.20100625	2.1	0.10	0.21	0.96
Zinc	80.9	0.000142	0.0114878	0.5	0.0061	0.00305	1	0.02	0.72689	225	0.00	22.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 6. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.666	19.98	0.003	13.5	0.0405	1	22	0.910022727	9.63	0.09	1.91	0.48
Cadmium	0.72	0.666	0.47952	0.005	13.5	0.0675	1	22	0.024864545	2.3	0.01	0.23	0.11
Chromium	14	0.666	9.324	0.01	13.5	0.135	1	22	0.429954545	56.8	0.01	5.68	0.08
Cobalt	7.4	0.666	4.9284	0.0019	13.5	0.02565	1	22	0.225184091	20	0.01	5	0.05
Copper	52.2	0.666	34.7652	0.06	13.5	0.81	1	22	1.617054545	35.4	0.05	24.3	0.07
Lead	16.3	0.666	10.8558	0.0025	13.5	0.03375	1	22	0.494979545	80	0.01	8	0.06
Manganese	1100	0.666	732.6	15.9	13.5	214.65	1	22	43.05681818	268	0.16	83	0.52
Molybdenum	7.4	0.666	4.9284	NM	13.5	N/A	1	22	0.224018182	1.9	0.12	0.19	**1.18**
Nickel	11.8	0.666	7.8588	0.4	13.5	5.4	1	22	0.602672727	42.1	0.01	23.1	0.03
Selenium	0.085	0.666	0.05661	0.001	13.5	0.0135	1	22	0.003186818	0.25	0.01	0.025	0.13
Thallium	0.49	0.666	0.32634	0.0003	13.5	0.00405	1	22	0.015017727	0.74	0.02	0.074	0.20
Uranium	262	0.666	174.492	0.103	13.5	1.3905	1	22	7.994659091	5	**1.60**	0.5	**15.99**
Vanadium	28.3	0.666	18.8478	0.00025	13.5	0.003375	1	22	0.856871591	2.1	0.41	0.21	**4.08**
Zinc	80.9	0.666	53.8794	0.5	13.5	6.75	1	22	2.755881818	225	0.01	22.5	0.12

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 6. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.0122	0.366	0.003	0.57	0.00171	1	7	0.05253	9.63	0.01	1.91	0.03
Cadmium	0.72	0.0122	0.008784	0.005	0.57	0.00285	1	7	0.001662	2.3	0.00	0.23	0.01
Chromium	14	0.0122	0.1708	0.01	0.57	0.0057	1	7	0.025214286	56.8	0.00	5.68	0.00
Cobalt	7.4	0.0122	0.09028	0.0019	0.57	0.001083	1	7	0.013051857	20	0.00	5	0.00
Copper	52.2	0.0122	0.63684	0.06	0.57	0.0342	1	7	0.095862857	35.4	0.00	24.3	0.00
Lead	16.3	0.0122	0.19886	0.0025	0.57	0.001425	1	7	0.028612143	80	0.00	8	0.00
Manganese	1100	0.0122	13.42	15.9	0.57	9.063	1	7	3.211857143	268	0.01	83	0.04
Molybdenum	7.4	0.0122	0.09028	NM	0.57	N/A	1	7	0.012897143	1.9	0.01	0.19	0.07
Nickel	11.8	0.0122	0.14396	0.4	0.57	0.228	1	7	0.053137143	42.1	0.00	23.1	0.00
Selenium	0.085	0.0122	0.001037	0.001	0.57	0.00057	1	7	0.000229571	0.25	0.00	0.025	0.01
Thallium	0.49	0.0122	0.005978	0.0003	0.57	0.000171	1	7	0.000878429	0.74	0.00	0.074	0.01
Uranium	262	0.0122	3.1964	0.103	0.57	0.05871	1	7	0.465015714	5	0.09	0.5	0.93
Vanadium	28.3	0.0122	0.34526	0.00025	0.57	0.0001425	1	7	0.049343214	2.1	0.02	0.21	0.23
Zinc	80.9	0.0122	0.98698	0.5	0.57	0.285	1	7	0.181711429	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 6. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.00868	0.2604	0.003	0.329	0.000987	1	3.8	0.068786053	9.63	0.01	1.91	0.04
Cadmium	0.72	0.00868	0.0062496	0.005	0.329	0.001645	1	3.8	0.002077526	2.3	0.00	0.23	0.01
Chromium	14	0.00868	0.12152	0.01	0.329	0.00329	1	3.8	0.032844737	56.8	0.00	5.68	0.01
Cobalt	7.4	0.00868	0.064232	0.0019	0.329	0.0006251	1	3.8	0.017067658	20	0.00	5	0.00
Copper	52.2	0.00868	0.453096	0.06	0.329	0.01974	1	3.8	0.124430526	35.4	0.00	24.3	0.01
Lead	16.3	0.00868	0.141484	0.0025	0.329	0.0008225	1	3.8	0.037449079	80	0.00	8	0.00
Manganese	1100	0.00868	9.548	15.9	0.329	5.2311	1	3.8	3.889236842	268	0.01	83	0.05
Molybdenum	7.4	0.00868	0.064232	NM	0.329	N/A	1	3.8	0.016903158	1.9	0.01	0.19	0.09
Nickel	11.8	0.00868	0.102424	0.4	0.329	0.1316	1	3.8	0.061585263	42.1	0.00	23.1	0.00
Selenium	0.085	0.00868	0.0007378	0.001	0.329	0.000329	1	3.8	0.000280737	0.25	0.00	0.025	0.01
Thallium	0.49	0.00868	0.0042532	0.0003	0.329	0.0000987	1	3.8	0.001145237	0.74	0.00	0.074	0.02
Uranium	262	0.00868	2.27416	0.103	0.329	0.033887	1	3.8	0.607380789	5	0.12	0.5	**1.21**
Vanadium	28.3	0.00868	0.245644	0.00025	0.329	0.00008225	1	3.8	0.064664803	2.1	0.03	0.21	0.31
Zinc	80.9	0.00868	0.702212	0.5	0.329	0.1645	1	3.8	0.228082105	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 6. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000234	0.00702	0.003	0.00157	0.00000471	1	0.002	3.512355	9.63	0.36	1.91	**1.84**
Cadmium	0.72	0.000234	0.00016848	0.005	0.00157	0.00000785	1	0.002	0.088165	2.3	0.04	0.23	0.38
Chromium	14	0.000234	0.003276	0.01	0.00157	0.0000157	1	0.002	1.64585	56.8	0.03	5.68	0.29
Cobalt	7.4	0.000234	0.0017316	0.0019	0.00157	0.000002983	1	0.002	0.8672915	20	0.04	5	0.17
Copper	52.2	0.000234	0.0122148	0.06	0.00157	0.0000942	1	0.002	6.1545	35.4	0.17	24.3	0.25
Lead	16.3	0.000234	0.0038142	0.0025	0.00157	0.000003925	1	0.002	1.9090625	80	0.02	8	0.24
Manganese	1100	0.000234	0.2574	15.9	0.00157	0.024963	1	0.002	141.1815	268	0.53	83	**1.70**
Molybdenum	7.4	0.000234	0.0017316	NM	0.00157	N/A	1	0.002	0.8658	1.9	0.46	0.19	**4.56**
Nickel	11.8	0.000234	0.0027612	0.4	0.00157	0.000628	1	0.002	1.6946	42.1	0.04	23.1	0.07
Selenium	0.085	0.000234	0.00001989	0.001	0.00157	0.00000157	1	0.002	0.01073	0.25	0.04	0.025	0.43
Thallium	0.49	0.000234	0.00011466	0.0003	0.00157	0.000000471	1	0.002	0.0575655	0.74	0.08	0.074	0.78
Uranium	262	0.000234	0.061308	0.103	0.00157	0.00016171	1	0.002	30.734855	5	**6.15**	0.5	**61.47**
Vanadium	28.3	0.000234	0.0066222	0.00025	0.00157	3.925E-07	1	0.002	3.31129625	2.1	**1.58**	0.21	**15.77**
Zinc	80.9	0.000234	0.0189306	0.5	0.00157	0.000785	1	0.002	9.8578	225	0.04	22.5	0.44

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 6. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 1: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000977	0.02931	0.003	0.00378	0.00001134	1	0.009	3.257926667	9.63	0.34	1.91	**1.71**
Cadmium	0.72	0.000977	0.00070344	0.005	0.00378	0.0000189	1	0.009	0.08026	2.3	0.03	0.23	0.35
Chromium	14	0.000977	0.013678	0.01	0.00378	0.0000378	1	0.009	1.523977778	56.8	0.03	5.68	0.27
Cobalt	7.4	0.000977	0.0072298	0.0019	0.00378	0.000007182	1	0.009	0.804109111	20	0.04	5	0.16
Copper	52.2	0.000977	0.0509994	0.06	0.00378	0.0002268	1	0.009	5.6918	35.4	0.16	24.3	0.23
Lead	16.3	0.000977	0.0159251	0.0025	0.00378	0.00000945	1	0.009	1.770505556	80	0.02	8	0.22
Manganese	1100	0.000977	1.0747	15.9	0.00378	0.060102	1	0.009	126.0891111	268	0.47	83	**1.52**
Molybdenum	7.4	0.000977	0.0072298	NM	0.00378	N/A	1	0.009	0.803311111	1.9	0.42	0.19	**4.23**
Nickel	11.8	0.000977	0.0115286	0.4	0.00378	0.001512	1	0.009	1.448955556	42.1	0.03	23.1	0.06
Selenium	0.085	0.000977	0.000083045	0.001	0.00378	0.00000378	1	0.009	0.009647222	0.25	0.04	0.025	0.39
Thallium	0.49	0.000977	0.00047873	0.0003	0.00378	0.000001134	1	0.009	0.053318222	0.74	0.07	0.074	0.72
Uranium	262	0.000977	0.255974	0.103	0.00378	0.00038934	1	0.009	28.48481556	5	**5.70**	0.5	**56.97**
Vanadium	28.3	0.000977	0.0276491	0.00025	0.00378	0.000000945	1	0.009	3.072227222	2.1	**1.46**	0.21	**14.63**
Zinc	80.9	0.000977	0.0790393	0.5	0.00378	0.00189	1	0.009	8.992144444	225	0.04	22.5	0.40

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 17. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000538			0.00392			100	0.0122462		1	0.0175					
Arsenic	92.4	0.0000538	0.00497112	0.0093	0.00392	0.000036456	2.1	100	0.0122462	0.02571702	1	0.0175	1.7556912	22.8	0.08	5.7	0.31
Cadmium	0.86	0.0000538	0.000046268	0.0044	0.00392	0.000017248	1.3	100	0.0122462	0.01592006	1	0.0175	0.9133472	3.4	0.27	0.85	**1.07**
Chromium	21.2	0.0000538	0.00114056	0.0169	0.00392	0.000066248	2.2	100	0.0122462	0.02694164	1	0.0175	1.608482743	5	0.32	1	**1.61**
Cobalt	19.4	0.0000538	0.00104372	0.0024	0.00392	0.000009408	1.26	100	0.0122462	0.015430212	1	0.0175	0.941905143	43.9	0.02	23.1	0.04
Copper	58.4	0.0000538	0.00314192	0.051	0.00392	0.00019992	69.1	100	0.0122462	0.84621242	1	0.0175	48.54595771	33.2	**1.46**	26.9	**1.80**
Lead	28.9	0.0000538	0.00155482	0.0059	0.00392	0.000023128	3.5	100	0.0122462	0.0428617	1	0.0175	2.539408457	15	0.17	1.5	**1.69**
Manganese	1160	0.0000538	0.062408	15.9	0.00392	0.062328	108	100	0.0122462	1.3225896	1	0.0175	82.70432	9770	0.01	977	0.08
Molybdenum	5	0.0000538	0.000269	NM	0.00392	N/A	NM	100	0.0122462	N/A	1	0.0175	N/A	35.5	N/A	3.55	N/A
Nickel	28.6	0.0000538	0.00153868	0.32	0.00392	0.0012544	2	100	0.0122462	0.0244924	1	0.0175	1.559170286	79	0.02	57.2	0.03
Selenium	0.095	0.0000538	0.000005111	0.0005	0.00392	0.00000196	0.3	100	0.0122462	0.00367386	1	0.0175	0.210338914	0.8	0.26	0.4	0.53
Thallium	0.25	0.0000538	0.00001345	0.0015	0.00392	0.00000588	0.1	100	0.0122462	0.00122462	1	0.0175	0.071082857	1.2	0.06	0.12	0.59
Uranium	88.6	0.0000538	0.00476668	0.13	0.00392	0.0005096	7.52	100	0.0122462	0.092091424	1	0.0175	5.5638688	1600	0.00	160	0.03
Vanadium	40.9	0.0000538	0.00220042	0.0082	0.00392	0.000032144	NM	100	0.0122462	N/A	1	0.0175	N/A	114	N/A	11.4	N/A
Zinc	90.3	0.0000538	0.00485814	0.38	0.00392	0.0014896	152	100	0.0122462	1.8614224	1	0.0175	106.7297223	223.5	0.48	10.5	**10.16**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 17. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003			60		40	0.003138		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000182	0.0168168	0.0093	0.003	0.0000279	4	60	2.1	40	0.003138	0.01016712	1	0.0114	2.369457895	22.8	0.10	5.7	0.42
Cadmium	0.86	0.000182	0.00015652	0.0044	0.003	0.0000132	2.1	60	1.3	40	0.003138	0.00558564	1	0.0114	0.50485614	3.4	0.15	0.85	0.59
Chromium	21.2	0.000182	0.0038584	0.0169	0.003	0.0000507	0.7	60	2.2	40	0.003138	0.0040794	1	0.0114	0.700745614	5	0.14	1	0.70
Cobalt	19.4	0.000182	0.0035308	0.0024	0.003	0.0000072	0.3	60	1.26	40	0.003138	0.002146392	1	0.0114	0.498630877	43.9	0.01	23.1	0.02
Copper	58.4	0.000182	0.0106288	0.051	0.003	0.000153	5	60	69.1	40	0.003138	0.09614832	1	0.0114	9.379835088	33.2	0.28	26.9	0.35
Lead	28.9	0.000182	0.0052598	0.0059	0.003	0.0000177	0.5	60	3.5	40	0.003138	0.0053346	1	0.0114	0.930885965	15	0.06	1.5	0.62
Manganese	1160	0.000182	0.21112	15.9	0.003	0.0477	610	60	108	40	0.003138	1.2840696	1	0.0114	135.341193	9770	0.01	977	0.14
Molybdenum	5	0.000182	0.00091	NM	0.003	N/A	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	28.6	0.000182	0.0052052	0.32	0.003	0.00096	5	60	2	40	0.003138	0.0119244	1	0.0114	1.586807018	79	0.02	57.2	0.03
Selenium	0.095	0.000182	0.00001729	0.0005	0.003	0.0000015	0.05	60	0.3	40	0.003138	0.0004707	1	0.0114	0.042937719	0.8	0.05	0.4	0.11
Thallium	0.25	0.000182	0.0000455	0.0015	0.003	0.0000045	0.05	60	0.1	40	0.003138	0.00021966	1	0.0114	0.023654386	1.2	0.02	0.12	0.20
Uranium	88.6	0.000182	0.0161252	0.13	0.003	0.00039	4.381676	60	7.52	40	0.003138	0.017688924	1	0.0114	3.000361717	1,600	0.00	160	0.02
Vanadium	40.9	0.000182	0.0074438	0.0082	0.003	0.0000246	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	90.3	0.000182	0.0164346	0.38	0.003	0.00114	40	60	152	40	0.003138	0.2661024	1	0.0114	24.88394737	223.5	0.11	10.5	**2.37**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 17. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003			100	0.003138		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000182	0.0168168	0.0093	0.003	0.0000279	4	100	0.003138	0.012552	1	0.0114	2.578657895	22.8	0.11	5.7	0.45
Cadmium	0.86	0.000182	0.00015652	0.0044	0.003	0.0000132	2.1	100	0.003138	0.0065898	1	0.0114	0.592940351	3.4	0.17	0.85	0.70
Chromium	21.2	0.000182	0.0038584	0.0169	0.003	0.0000507	0.7	100	0.003138	0.0021966	1	0.0114	0.535587719	5	0.11	1	0.54
Cobalt	19.4	0.000182	0.0035308	0.0024	0.003	0.0000072	0.3	100	0.003138	0.0009414	1	0.0114	0.392929825	43.9	0.01	23.1	0.02
Copper	58.4	0.000182	0.0106288	0.051	0.003	0.000153	5	100	0.003138	0.01569	1	0.0114	2.322087719	33.2	0.07	26.9	0.09
Lead	28.9	0.000182	0.0052598	0.0059	0.003	0.0000177	0.5	100	0.003138	0.001569	1	0.0114	0.600570175	15	0.04	1.5	0.40
Manganese	1160	0.000182	0.21112	15.9	0.003	0.0477	610	100	0.003138	1.91418	1	0.0114	190.6140351	9770	0.02	977	0.20
Molybdenum	5	0.000182	0.00091	NM	0.003	N/A	NM	100	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	28.6	0.000182	0.0052052	0.32	0.003	0.00096	5	100	0.003138	0.01569	1	0.0114	1.917122807	79	0.02	57.2	0.03
Selenium	0.095	0.000182	0.00001729	0.0005	0.003	0.0000015	0.05	100	0.003138	0.0001569	1	0.0114	0.015411404	0.8	0.02	0.4	0.04
Thallium	0.25	0.000182	0.0000455	0.0015	0.003	0.0000045	0.05	100	0.003138	0.0001569	1	0.0114	0.018149123	1.2	0.02	0.12	0.15
Uranium	88.6	0.000182	0.0161252	0.13	0.003	0.00039	4.381676	100	0.003138	0.0137497	1	0.0114	2.654815727	1600	0.00	160	0.02
Vanadium	40.9	0.000182	0.0074438	0.0082	0.003	0.0000246	NM	100	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	90.3	0.000182	0.0164346	0.38	0.003	0.00114	40	100	0.003138	0.12552	1	0.0114	12.55215789	223.5	0.06	10.5	**1.20**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 17. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00328			0.0128				100	0.00762		1	0.103					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.00328	0.303072	0.0093	0.0128	0.00011904	0.071	6.5604	100	0.00762	0.04999025	1	0.103	3.428944544	22.8	0.15	5.7	0.60
Cadmium	0.86	0.00328	0.0028208	0.0044	0.0128	0.00005632	69.561	59.82246	100	0.00762	0.45584715	1	0.103	4.453633643	3.4	**1.31**	0.85	**5.24**
Chromium	21.2	0.00328	0.069536	0.0169	0.0128	0.00021632	0.8	16.96	100	0.00762	0.1292352	1	0.103	1.93191767	5	0.39	1	**1.93**
Cobalt	19.4	0.00328	0.063632	0.0024	0.0128	0.00003072	0.18	3.492	100	0.00762	0.02660904	1	0.103	0.876424854	43.9	0.02	23.1	0.04
Copper	58.4	0.00328	0.191552	0.051	0.0128	0.0006528	1.398	81.6432	100	0.00762	0.62212118	1	0.103	7.906077515	33.2	0.24	26.9	0.29
Lead	28.9	0.00328	0.094792	0.0059	0.0128	0.00007552	2.659	76.8451	100	0.00762	0.58555966	1	0.103	6.606089146	15	0.44	1.5	**4.40**
Manganese	1160	0.00328	3.8048	15.9	0.0128	0.20352	0.079	91.64	100	0.00762	0.6982968	1	0.103	45.69530874	9770	0.00	977	0.05
Molybdenum	5	0.00328	0.0164	NM	0.0128	N/A	1	5	100	0.00762	0.0381	1	0.103	0.529126214	35.5	0.01	3.55	0.15
Nickel	28.6	0.00328	0.093808	0.32	0.0128	0.004096	1.143	32.6898	100	0.00762	0.24909628	1	0.103	3.368934718	79	0.04	57.2	0.06
Selenium	0.095	0.00328	0.0003116	0.0005	0.0128	0.0000064	1.754	0.16663	100	0.00762	0.00126972	1	0.103	0.015414763	0.8	0.02	0.4	0.04
Thallium	0.25	0.00328	0.00082	0.0015	0.0128	0.0000192	0.123	0.03075	100	0.00762	0.00023432	1	0.103	0.010422476	1.2	0.01	0.12	0.09
Uranium	88.6	0.00328	0.290608	0.13	0.0128	0.001664	1	88.6	100	0.00762	0.675132	1	0.103	9.392271845	1600	0.01	160	0.06
Vanadium	40.9	0.00328	0.134152	0.0082	0.0128	0.00010496	0.019	0.7771	100	0.00762	0.0059215	1	0.103	1.360955942	114	0.01	11.4	0.12
Zinc	90.3	0.00328	0.296184	0.38	0.0128	0.004864	16.364	1477.6692	100	0.00762	11.2598393	1	0.103	112.2416243	223.5	0.50	10.5	**10.69**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 17. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.02023			0.046				100	0.04697		1	0.68					
Arsenic	92.4	0.02023	1.869252	0.0093	0.046	0.0004278	0.071	6.5604	100	0.04697	0.30814199	1	0.68	3.2026791	22.8	0.14	5.7	0.56
Cadmium	0.86	0.02023	0.0173978	0.0044	0.046	0.0002024	69.561	59.82246	100	0.04697	2.80986095	1	0.68	4.158031097	3.4	**1.22**	0.85	**4.89**
Chromium	21.2	0.02023	0.428876	0.0169	0.046	0.0007774	0.8	16.96	100	0.04697	0.7966112	1	0.68	1.803330294	5	0.36	1	**1.80**
Cobalt	19.4	0.02023	0.392462	0.0024	0.046	0.0001104	0.18	3.492	100	0.04697	0.16401924	1	0.68	0.818517118	43.9	0.02	23.1	0.04
Copper	58.4	0.02023	1.181432	0.051	0.046	0.002346	1.398	81.6432	100	0.04697	3.8347811	1	0.68	7.380233976	33.2	0.22	26.9	0.27
Lead	28.9	0.02023	0.584647	0.0059	0.046	0.0002714	2.659	76.8451	100	0.04697	3.60941435	1	0.68	6.168136393	15	0.41	1.5	**4.11**
Manganese	1160	0.02023	23.4668	15.9	0.046	0.7314	0.079	91.64	100	0.04697	4.3043308	1	0.68	41.91548647	9770	0.00	977	0.04
Molybdenum	5	0.02023	0.10115	NM	0.046	N/A	1	5	100	0.04697	0.23485	1	0.68	0.494117647	35.5	0.01	3.55	0.14
Nickel	28.6	0.02023	0.578578	0.32	0.046	0.01472	1.143	32.6898	100	0.04697	1.53543991	1	0.68	3.130496921	79	0.04	57.2	0.05
Selenium	0.095	0.02023	0.00192185	0.0005	0.046	0.000023	1.754	0.16663	100	0.04697	0.00782661	1	0.68	0.014369796	0.8	0.02	0.4	0.04
Thallium	0.25	0.02023	0.0050575	0.0015	0.046	0.000069	0.123	0.03075	100	0.04697	0.00144433	1	0.68	0.009662982	1.2	0.01	0.12	0.08
Uranium	88.6	0.02023	1.792378	0.13	0.046	0.00598	1	88.6	100	0.04697	4.161542	1	0.68	8.764558824	1600	0.01	160	0.05
Vanadium	40.9	0.02023	0.827407	0.0082	0.046	0.0003772	0.019	0.7771	100	0.04697	0.03650039	1	0.68	1.271006746	114	0.01	11.4	0.11
Zinc	90.3	0.02023	1.826769	0.38	0.046	0.01748	16.364	1477.6692	100	0.04697	69.4061223	1	0.68	104.7799578	223.5	0.47	10.5	**9.98**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 17. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035			100	0.01841		1	0.45					
Arsenic	92.4	0.00189	0.174636	0.0093	0.035	0.0003255	4	100	0.01841	0.07364	1	0.45	0.552447778	22.8	0.02	5.7	0.10
Cadmium	0.86	0.00189	0.0016254	0.0044	0.035	0.000154	2.1	100	0.01841	0.038661	1	0.45	0.089867556	3.4	0.03	0.85	0.11
Chromium	21.2	0.00189	0.040068	0.0169	0.035	0.0005915	0.7	100	0.01841	0.012887	1	0.45	0.118992222	5	0.02	1	0.12
Cobalt	19.4	0.00189	0.036666	0.0024	0.035	0.000084	0.3	100	0.01841	0.005523	1	0.45	0.09394	43.9	0.00	23.1	0.00
Copper	58.4	0.00189	0.110376	0.051	0.035	0.001785	5	100	0.01841	0.09205	1	0.45	0.453802222	33.2	0.01	26.9	0.02
Lead	28.9	0.00189	0.054621	0.0059	0.035	0.0002065	0.5	100	0.01841	0.009205	1	0.45	0.142294444	15	0.01	1.5	0.09
Manganese	1160	0.00189	2.1924	15.9	0.035	0.5565	610	100	0.01841	11.2301	1	0.45	31.06444444	9770	0.00	977	0.03
Molybdenum	5	0.00189	0.00945	NM	0.035	N/A	NM	100	0.01841	N/A	1	0.45	N/A	35.5	N/A	3.55	N/A
Nickel	28.6	0.00189	0.054054	0.32	0.035	0.0112	5	100	0.01841	0.09205	1	0.45	0.349564444	79	0.00	57.2	0.01
Selenium	0.095	0.00189	0.00017955	0.0005	0.035	0.0000175	0.05	100	0.01841	0.0009205	1	0.45	0.002483444	0.8	0.00	0.4	0.01
Thallium	0.25	0.00189	0.0004725	0.0015	0.035	0.0000525	0.05	100	0.01841	0.0009205	1	0.45	0.003212222	1.2	0.00	0.12	0.03
Uranium	88.6	0.00189	0.167454	0.13	0.035	0.00455	4.381676	100	0.01841	0.0806667	1	0.45	0.561490345	1600	0.00	160	0.00
Vanadium	40.9	0.00189	0.077301	0.0082	0.035	0.000287	NM	100	0.01841	N/A	1	0.45	N/A	114	N/A	11.4	N/A
Zinc	90.3	0.00189	0.170667	0.38	0.035	0.0133	40	100	0.01841	0.7364	1	0.45	2.04526	223.5	0.01	10.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 17. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085				100	0.006236		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000724	0.0668976	0.0093	0.0085	0.00007905	0.925	85.47	100	0.006236	0.5329909	1	0.055	10.90850127	22.8	0.48	5.7	**1.91**
Cadmium	0.86	0.000724	0.00062264	0.0044	0.0085	0.0000374	190	163.4	100	0.006236	1.0189624	1	0.055	18.53858982	3.4	**5.45**	0.85	**21.81**
Chromium	21.2	0.000724	0.0153488	0.0169	0.0085	0.00014365	11.416	242.0192	100	0.006236	1.5092317	1	0.055	27.72225784	5	**5.54**	1	**27.72**
Cobalt	19.4	0.000724	0.0140456	0.0024	0.0085	0.0000204	0.321	6.2274	100	0.006236	0.0388341	1	0.055	0.961819389	43.9	0.02	23.1	0.04
Copper	58.4	0.000724	0.0422816	0.051	0.0085	0.0004335	5.492	320.7328	100	0.006236	2.0000897	1	0.055	37.1419062	33.2	**1.12**	26.9	**1.38**
Lead	28.9	0.000724	0.0209236	0.0059	0.0085	0.00005015	228.261	6596.7429	100	0.006236	41.137289	1	0.055	748.332045	15	**49.89**	1.5	**498.89**
Manganese	1160	0.000724	0.83984	15.9	0.0085	0.13515	0.228	264.48	100	0.006236	1.6492973	1	0.055	47.71431418	9770	0.00	977	0.05
Molybdenum	5	0.000724	0.00362	NM	0.0085	N/A	2.091	10.455	100	0.006236	0.0651974	1	0.055	1.251225091	35.5	0.04	3.55	0.35
Nickel	28.6	0.000724	0.0207064	0.32	0.0085	0.00272	7.802	223.1372	100	0.006236	1.3914836	1	0.055	25.72563599	79	0.33	57.2	0.45
Selenium	0.095	0.000724	0.00006878	0.0005	0.0085	0.00000425	13.733	1.304635	100	0.006236	0.0081357	1	0.055	0.149249707	0.8	0.19	0.4	0.37
Thallium	0.25	0.000724	0.000181	0.0015	0.0085	0.00001275	1	0.25	100	0.006236	0.001559	1	0.055	0.031868182	1.2	0.03	0.12	0.27
Uranium	88.6	0.000724	0.0641464	0.13	0.0085	0.001105	0.063	5.5818	100	0.006236	0.0348081	1	0.055	1.819263724	1600	0.00	160	0.01
Vanadium	40.9	0.000724	0.0296116	0.0082	0.0085	0.0000697	0.088	3.5992	100	0.006236	0.0224446	1	0.055	0.94774384	114	0.01	11.4	0.08
Zinc	90.3	0.000724	0.0653772	0.38	0.0085	0.00323	49.51	4470.753	100	0.006236	27.879616	1	0.055	508.1495074	223.5	**2.27**	10.5	**48.40**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 17. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	92.4	0.000142	0.0131208	0.0093	0.0061	0.00005673	19	100	0.005778	0.109782	1	0.02	6.1479765	9.63	0.64	1.91	**3.22**
Cadmium	0.86	0.000142	0.00012212	0.0044	0.0061	0.00002684	4	100	0.005778	0.023112	1	0.02	1.163048	2.3	0.51	0.23	**5.06**
Chromium	21.2	0.000142	0.0030104	0.0169	0.0061	0.00010309	16	100	0.005778	0.092448	1	0.02	4.7780745	56.8	0.08	5.68	0.84
Cobalt	19.4	0.000142	0.0027548	0.0024	0.0061	0.00001464	15	100	0.005778	0.08667	1	0.02	4.471972	20	0.22	5	0.89
Copper	58.4	0.000142	0.0082928	0.051	0.0061	0.0003111	116	100	0.005778	0.670248	1	0.02	33.942595	35.4	0.96	24.3	**1.40**
Lead	28.9	0.000142	0.0041038	0.0059	0.0061	0.00003599	37.9	100	0.005778	0.2189862	1	0.02	11.1562995	80	0.14	8	**1.39**
Manganese	1160	0.000142	0.16472	15.9	0.0061	0.09699	1420	100	0.005778	8.20476	1	0.02	423.3235	268	**1.58**	83	**5.10**
Molybdenum	5	0.000142	0.00071	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	28.6	0.000142	0.0040612	0.32	0.0061	0.001952	26	100	0.005778	0.150228	1	0.02	7.81206	42.1	0.19	23.1	0.34
Selenium	0.095	0.000142	0.00001349	0.0005	0.0061	0.00000305	0.5	100	0.005778	0.002889	1	0.02	0.145277	0.25	0.58	0.025	**5.81**
Thallium	0.25	0.000142	0.0000355	0.0015	0.0061	0.00000915	0.4	100	0.005778	0.0023112	1	0.02	0.1177925	0.74	0.16	0.074	**1.59**
Uranium	88.6	0.000142	0.0125812	0.13	0.0061	0.000793	876.08901	100	0.005778	5.0620423	1	0.02	253.770825	5	**50.75**	0.5	**507.54**
Vanadium	40.9	0.000142	0.0058078	0.0082	0.0061	0.00005002	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	90.3	0.000142	0.0128226	0.38	0.0061	0.002318	147	100	0.005778	0.849366	1	0.02	43.22533	225	0.19	22.5	**1.92**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 23. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	92.4	0.000142	0.0131208	0.0093	0.0061	0.00005673	4	100	0.005778	0.023112	1	0.02	1.8144765	9.63	0.19	1.91	0.95
Cadmium	0.86	0.000142	0.00012212	0.0044	0.0061	0.00002684	2.1	100	0.005778	0.0121338	1	0.02	0.614138	2.3	0.27	0.23	**2.67**
Chromium	21.2	0.000142	0.0030104	0.0169	0.0061	0.00010309	0.7	100	0.005778	0.0040446	1	0.02	0.3579045	56.8	0.01	5.68	0.06
Cobalt	19.4	0.000142	0.0027548	0.0024	0.0061	0.00001464	0.3	100	0.005778	0.0017334	1	0.02	0.225142	20	0.01	5	0.05
Copper	58.4	0.000142	0.0082928	0.051	0.0061	0.0003111	5	100	0.005778	0.02889	1	0.02	1.874695	35.4	0.05	24.3	0.08
Lead	28.9	0.000142	0.0041038	0.0059	0.0061	0.00003599	0.5	100	0.005778	0.002889	1	0.02	0.3514395	80	0.00	8	0.04
Manganese	1160	0.000142	0.16472	15.9	0.0061	0.09699	610	100	0.005778	3.52458	1	0.02	189.3145	268	0.71	83	**2.28**
Molybdenum	5	0.000142	0.00071	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	28.6	0.000142	0.0040612	0.32	0.0061	0.001952	5	100	0.005778	0.02889	1	0.02	1.74516	42.1	0.04	23.1	0.08
Selenium	0.095	0.000142	0.00001349	0.0005	0.0061	0.00000305	0.05	100	0.005778	0.0002889	1	0.02	0.015272	0.25	0.06	0.025	0.61
Thallium	0.25	0.000142	0.0000355	0.0015	0.0061	0.00000915	0.05	100	0.005778	0.0002889	1	0.02	0.0166775	0.74	0.02	0.074	0.23
Uranium	88.6	0.000142	0.0125812	0.13	0.0061	0.000793	4.381676	100	0.005778	0.0253173	1	0.02	1.934576196	5	0.39	0.5	**3.87**
Vanadium	40.9	0.000142	0.0058078	0.0082	0.0061	0.00005002	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	90.3	0.000142	0.0128226	0.38	0.0061	0.002318	40	100	0.005778	0.23112	1	0.02	12.31303	225	0.05	22.5	0.55

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 17. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5			100	1.554		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.666	61.5384	0.0093	13.5	0.12555	4	100	1.554	6.216	1	22	3.085452273	9.63	0.32	1.91	**1.62**
Cadmium	0.86	0.666	0.57276	0.0044	13.5	0.0594	2.1	100	1.554	3.2634	1	22	0.177070909	2.3	0.08	0.23	0.77
Chromium	21.2	0.666	14.1192	0.0169	13.5	0.22815	0.7	100	1.554	1.0878	1	22	0.701597727	56.8	0.01	5.68	0.12
Cobalt	19.4	0.666	12.9204	0.0024	13.5	0.0324	0.3	100	1.554	0.4662	1	22	0.609954545	20	0.03	5	0.12
Copper	58.4	0.666	38.8944	0.051	13.5	0.6885	5	100	1.554	7.77	1	22	2.152404545	35.4	0.06	24.3	0.09
Lead	28.9	0.666	19.2474	0.0059	13.5	0.07965	0.5	100	1.554	0.777	1	22	0.913820455	80	0.01	8	0.11
Manganese	1160	0.666	772.56	15.9	13.5	214.65	610	100	1.554	947.94	1	22	87.96136364	268	0.33	83	**1.06**
Molybdenum	5	0.666	3.33	NM	13.5	N/A	NM	100	1.554	N/A	1	22	N/A	1.9	N/A	0.19	N/A
Nickel	28.6	0.666	19.0476	0.32	13.5	4.32	5	100	1.554	7.77	1	22	1.415345455	42.1	0.03	23.1	0.06
Selenium	0.095	0.666	0.06327	0.0005	13.5	0.00675	0.05	100	1.554	0.0777	1	22	0.006714545	0.25	0.03	0.025	0.27
Thallium	0.25	0.666	0.1665	0.0015	13.5	0.02025	0.05	100	1.554	0.0777	1	22	0.012020455	0.74	0.02	0.074	0.16
Uranium	88.6	0.666	59.0076	0.13	13.5	1.755	4.381676	100	1.554	6.8091245	1	22	3.071442023	5	0.61	0.5	**6.14**
Vanadium	40.9	0.666	27.2394	0.0082	13.5	0.1107	NM	100	1.554	N/A	1	22	N/A	2.1	N/A	0.21	N/A
Zinc	90.3	0.666	60.1398	0.38	13.5	5.13	40	100	1.554	62.16	1	22	5.792263636	225	0.03	22.5	0.26

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 17. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57				100	0.4218		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.0122	1.12728	0.0093	0.57	0.005301	0.071	6.5604	100	0.4218	2.76717672	1	7	0.557108246	9.63	0.06	1.91	0.29
Cadmium	0.86	0.0122	0.010492	0.0044	0.57	0.002508	69.561	59.82246	100	0.4218	25.2331136	1	7	3.606587661	2.3	**1.57**	0.23	**15.68**
Chromium	21.2	0.0122	0.25864	0.0169	0.57	0.009633	0.8	16.96	100	0.4218	7.153728	1	7	1.060285857	56.8	0.02	5.68	0.19
Cobalt	19.4	0.0122	0.23668	0.0024	0.57	0.001368	0.18	3.492	100	0.4218	1.4729256	1	7	0.2444248	20	0.01	5	0.05
Copper	58.4	0.0122	0.71248	0.051	0.57	0.02907	1.398	81.6432	100	0.4218	34.4371018	1	7	5.02552168	35.4	0.14	24.3	0.21
Lead	28.9	0.0122	0.35258	0.0059	0.57	0.003363	2.659	76.8451	100	0.4218	32.4132632	1	7	4.681315169	80	0.06	8	0.59
Manganese	1160	0.0122	14.152	15.9	0.57	9.063	0.079	91.64	100	0.4218	38.653752	1	7	8.838393143	268	0.03	83	0.11
Molybdenum	5	0.0122	0.061	NM	0.57	N/A	1	5	100	0.4218	2.109	1	7	0.31	1.9	0.16	0.19	**1.63**
Nickel	28.6	0.0122	0.34892	0.32	0.57	0.1824	1.143	32.6898	100	0.4218	13.7885576	1	7	2.045696806	42.1	0.05	23.1	0.09
Selenium	0.095	0.0122	0.001159	0.0005	0.57	0.000285	1.754	0.16663	100	0.4218	0.07028453	1	7	0.010246933	0.25	0.04	0.025	0.41
Thallium	0.25	0.0122	0.00305	0.0015	0.57	0.000855	0.123	0.03075	100	0.4218	0.01297035	1	7	0.002410764	0.74	0.00	0.074	0.03
Uranium	88.6	0.0122	1.08092	0.13	0.57	0.0741	1	88.6	100	0.4218	37.37148	1	7	5.503785714	5	**1.10**	0.5	**11.01**
Vanadium	40.9	0.0122	0.49898	0.0082	0.57	0.004674	0.019	0.7771	100	0.4218	0.32778078	1	7	0.118776397	2.1	0.06	0.21	0.57
Zinc	90.3	0.0122	1.10166	0.38	0.57	0.2166	16.364	1477.6692	100	0.4218	623.280869	1	7	89.22844694	225	0.40	22.5	**3.97**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 17. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329				100	0.30132		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.00868	0.802032	0.0093	0.329	0.0030597	0.071	6.5604	100	0.30132	1.97677973	1	3.8	0.732071428	9.63	0.08	1.91	0.38
Cadmium	0.86	0.00868	0.0074648	0.0044	0.329	0.0014476	69.561	59.82246	100	0.30132	18.0257036	1	3.8	4.745951591	2.3	**2.06**	0.23	**20.63**
Chromium	21.2	0.00868	0.184016	0.0169	0.329	0.0055601	0.8	16.96	100	0.30132	5.1103872	1	3.8	1.394727184	56.8	0.02	5.68	0.25
Cobalt	19.4	0.00868	0.168392	0.0024	0.329	0.0007896	0.18	3.492	100	0.30132	1.05220944	1	3.8	0.321418695	20	0.02	5	0.06
Copper	58.4	0.00868	0.506912	0.051	0.329	0.016779	1.398	81.6432	100	0.30132	24.600729	1	3.8	6.61168948	35.4	0.19	24.3	0.27
Lead	28.9	0.00868	0.250852	0.0059	0.329	0.0019411	2.659	76.8451	100	0.30132	23.1549655	1	3.8	6.159936482	80	0.08	8	0.77
Manganese	1160	0.00868	10.0688	15.9	0.329	5.2311	0.079	91.64	100	0.30132	27.6129648	1	3.8	11.29285916	268	0.04	83	0.14
Molybdenum	5	0.00868	0.0434	NM	0.329	N/A	1	5	100	0.30132	1.5066	1	3.8	0.407894737	1.9	0.21	0.19	**2.15**
Nickel	28.6	0.00868	0.248248	0.32	0.329	0.10528	1.143	32.6898	100	0.30132	9.85009054	1	3.8	2.685162773	42.1	0.06	23.1	0.12
Selenium	0.095	0.00868	0.0008246	0.0005	0.329	0.0001645	1.754	0.16663	100	0.30132	0.05020895	1	3.8	0.013473171	0.25	0.05	0.025	0.54
Thallium	0.25	0.00868	0.00217	0.0015	0.329	0.0004935	0.123	0.03075	100	0.30132	0.00926559	1	3.8	0.003139234	0.74	0.00	0.074	0.04
Uranium	88.6	0.00868	0.769048	0.13	0.329	0.04277	1	88.6	100	0.30132	26.696952	1	3.8	7.23915	5	**1.45**	0.5	**14.48**
Vanadium	40.9	0.00868	0.355012	0.0082	0.329	0.0026978	0.019	0.7771	100	0.30132	0.23415577	1	3.8	0.155754098	2.1	0.07	0.21	0.74
Zinc	90.3	0.00868	0.783804	0.38	0.329	0.12502	16.364	1477.6692	100	0.30132	445.251283	1	3.8	117.4105546	225	0.52	22.5	**5.22**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 17. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157				100	0.004266		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000234	0.0216216	0.0093	0.00157	0.000014601	0.925	85.47	100	0.004266	0.364615	1	0.002	193.1256105	9.63	**20.05**	1.91	**101.11**
Cadmium	0.86	0.000234	0.00020124	0.0044	0.00157	0.000006908	190	163.4	100	0.004266	0.6970644	1	0.002	348.636274	2.3	**151.58**	0.23	**1515.81**
Chromium	21.2	0.000234	0.0049608	0.0169	0.00157	0.000026533	11.416	242.0192	100	0.004266	1.0324539	1	0.002	518.7206201	56.8	**9.13**	5.68	**91.32**
Cobalt	19.4	0.000234	0.0045396	0.0024	0.00157	0.000003768	0.321	6.2274	100	0.004266	0.0265661	1	0.002	15.5547282	20	0.78	5	**3.11**
Copper	58.4	0.000234	0.0136656	0.051	0.00157	0.00008007	5.492	320.7328	100	0.004266	1.3682461	1	0.002	690.9958974	35.4	**19.52**	24.3	**28.44**
Lead	28.9	0.000234	0.0067626	0.0059	0.00157	0.000009263	228.261	6596.7429	100	0.004266	28.141705	1	0.002	14074.23854	80	**175.93**	8	**1759.28**
Manganese	1160	0.000234	0.27144	15.9	0.00157	0.024963	0.228	264.48	100	0.004266	1.1282717	1	0.002	712.33734	268	**2.66**	83	**8.58**
Molybdenum	5	0.000234	0.00117	NM	0.00157	N/A	2.091	10.455	100	0.004266	0.044601	1	0.002	22.885515	1.9	**12.05**	0.19	**120.45**
Nickel	28.6	0.000234	0.0066924	0.32	0.00157	0.0005024	7.802	223.1372	100	0.004266	0.9519033	1	0.002	479.5490476	42.1	**11.39**	23.1	**20.76**
Selenium	0.095	0.000234	0.00002223	0.0005	0.00157	0.000000785	13.733	1.304635	100	0.004266	0.0055656	1	0.002	2.794293955	0.25	**11.18**	0.025	**111.77**
Thallium	0.25	0.000234	0.0000585	0.0015	0.00157	0.000002355	1	0.25	100	0.004266	0.0010665	1	0.002	0.5636775	0.74	0.76	0.074	**7.62**
Uranium	88.6	0.000234	0.0207324	0.13	0.00157	0.0002041	0.063	5.5818	100	0.004266	0.023812	1	0.002	22.3742294	5	**4.47**	0.5	**44.75**
Vanadium	40.9	0.000234	0.0095706	0.0082	0.00157	0.000012874	0.088	3.5992	100	0.004266	0.0153542	1	0.002	12.4688306	2.1	**5.94**	0.21	**59.38**
Zinc	90.3	0.000234	0.0211302	0.38	0.00157	0.0005966	49.51	4470.753	100	0.004266	19.072232	1	0.002	9546.979549	225	**42.43**	22.5	**424.31**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 17. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: East Haul Road; Water and Sediment Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378			58		42	0.005053		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	92.4	0.000977	0.0902748	0.0093	0.00378	0.000035154	4	58	2.1	42	0.005053	0.01617971	1	0.009	11.83218444	9.63	**1.23**	1.91	**6.19**
Cadmium	0.86	0.000977	0.00084022	0.0044	0.00378	0.000016632	2.1	58	1.3	42	0.005053	0.00891349	1	0.009	1.085593778	2.3	0.47	0.23	**4.72**
Chromium	21.2	0.000977	0.0207124	0.0169	0.00378	0.000063882	0.7	58	2.2	42	0.005053	0.00672049	1	0.009	3.055196889	56.8	0.05	5.68	0.54
Cobalt	19.4	0.000977	0.0189538	0.0024	0.00378	0.000009072	0.3	58	1.26	42	0.005053	0.00355327	1	0.009	2.501793511	20	0.13	5	0.50
Copper	58.4	0.000977	0.0570568	0.051	0.00378	0.00019278	5	58	69.1	42	0.005053	0.16130187	1	0.009	24.283494	35.4	0.69	24.3	1.00
Lead	28.9	0.000977	0.0282353	0.0059	0.00378	0.000022302	0.5	58	3.5	42	0.005053	0.00889328	1	0.009	4.127875778	80	0.05	8	0.52
Manganese	1160	0.000977	1.13332	15.9	0.00378	0.060102	610	58	108	42	0.005053	2.01695548	1	0.009	356.7086089	268	**1.33**	83	**4.30**
Molybdenum	5	0.000977	0.004885	NM	0.00378	N/A	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	1.9	N/A	0.19	N/A
Nickel	28.6	0.000977	0.0279422	0.32	0.00378	0.0012096	5	58	2	42	0.005053	0.01889822	1	0.009	5.338891111	42.1	0.13	23.1	0.23
Selenium	0.095	0.000977	0.000092815	0.0005	0.00378	0.00000189	0.05	58	0.3	42	0.005053	0.00078322	1	0.009	0.097546667	0.25	0.39	0.025	**3.90**
Thallium	0.25	0.000977	0.00024425	0.0015	0.00378	0.00000567	0.05	58	0.1	42	0.005053	0.00035876	1	0.009	0.067631444	0.74	0.09	0.074	0.91
Uranium	88.6	0.000977	0.0865622	0.13	0.00378	0.0004914	4.381676	58	7.52	42	0.005053	0.02880095	1	0.009	12.87272759	5	**2.57**	0.5	**25.75**
Vanadium	40.9	0.000977	0.0399593	0.0082	0.00378	0.000030996	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	2.1	N/A	0.21	N/A
Zinc	90.3	0.000977	0.0882231	0.38	0.00378	0.0014364	40	58	152	42	0.005053	0.43981312	1	0.009	58.83029111	225	0.26	22.5	**2.61**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 13. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000538			0.00392			100	0.0122462		1	0.0175					
Arsenic	239	0.0000538	0.0128582	0.0163	0.00392	0.000063896	2.1	100	0.0122462	0.02571702	1	0.0175	2.207949486	22.8	0.10	5.7	0.39
Cadmium	3.5	0.0000538	0.0001883	0.07	0.00392	0.0002744	1.3	100	0.0122462	0.01592006	1	0.0175	0.936157714	3.4	0.28	0.85	**1.10**
Chromium	66	0.0000538	0.0035508	0.0343	0.00392	0.000134456	2.2	100	0.0122462	0.02694164	1	0.0175	1.750108343	5	0.35	1	**1.75**
Cobalt	19.9	0.0000538	0.00107062	1.1	0.00392	0.004312	1.26	100	0.0122462	0.015430212	1	0.0175	1.189304686	43.9	0.03	23.1	0.05
Copper	83	0.0000538	0.0044654	0.286	0.00392	0.00112112	69.1	100	0.0122462	0.84621242	1	0.0175	48.67422514	33.2	**1.47**	26.9	**1.81**
Lead	84	0.0000538	0.0045192	0.0394	0.00392	0.000154448	3.5	100	0.0122462	0.0428617	1	0.0175	2.7163056	15	0.18	1.5	**1.81**
Manganese	5190	0.0000538	0.279222	120	0.00392	0.4704	108	100	0.0122462	1.3225896	1	0.0175	118.4120914	9770	0.01	977	0.12
Molybdenum	31.9	0.0000538	0.00171622	NM	0.00392	N/A	NM	100	0.0122462	N/A	1	0.0175	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.0000538	0.0023672	2.43	0.00392	0.0095256	2	100	0.0122462	0.0244924	1	0.0175	2.079154286	79	0.03	57.2	0.04
Selenium	90	0.0000538	0.004842	0.0653	0.00392	0.000255976	0.3	100	0.0122462	0.00367386	1	0.0175	0.501247771	0.8	0.63	0.4	**1.25**
Thallium	2.5	0.0000538	0.0001345	0.0002	0.00392	0.000000784	0.1	100	0.0122462	0.00122462	1	0.0175	0.0777088	1.2	0.06	0.12	0.65
Uranium	482	0.0000538	0.0259316	24	0.00392	0.09408	7.52	100	0.0122462	0.092091424	1	0.0175	12.1201728	1600	0.01	160	0.08
Vanadium	132	0.0000538	0.0071016	0.0005	0.00392	0.00000196	NM	100	0.0122462	N/A	1	0.0175	N/A	114	N/A	11.4	N/A
Zinc	381	0.0000538	0.0204978	5.48	0.00392	0.0214816	152	100	0.0122462	1.8614224	1	0.0175	108.7658171	223.5	0.49	10.5	**10.36**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 13. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000182			0.003			60		40	0.003138		1	0.0114					
Arsenic	239	0.000182	0.043498	0.0163	0.003	0.0000489	4	60	2.1	40	0.003138	0.01016712	1	0.0114	4.71175614	22.8	0.21	5.7	0.83
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	2.1	60	1.3	40	0.003138	0.00558564	1	0.0114	0.564266667	3.4	0.17	0.85	0.66
Chromium	66	0.000182	0.012012	0.0343	0.003	0.0001029	0.7	60	2.2	40	0.003138	0.0040794	1	0.0114	1.420552632	5	0.28	1	**1.42**
Cobalt	19.9	0.000182	0.0036218	1.1	0.003	0.0033	0.3	60	1.26	40	0.003138	0.002146392	1	0.0114	0.795455439	43.9	0.02	23.1	0.03
Copper	83	0.000182	0.015106	0.286	0.003	0.000858	5	60	69.1	40	0.003138	0.09614832	1	0.0114	9.834414035	33.2	0.30	26.9	0.37
Lead	84	0.000182	0.015288	0.0394	0.003	0.0001182	0.5	60	3.5	40	0.003138	0.0053346	1	0.0114	1.819368421	15	0.12	1.5	**1.21**
Manganese	5190	0.000182	0.94458	120	0.003	0.36	610	60	108	40	0.003138	1.2840696	1	0.0114	227.0745263	9770	0.02	977	0.23
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.000182	0.008008	2.43	0.003	0.00729	5	60	2	40	0.003138	0.0119244	1	0.0114	2.387929825	79	0.03	57.2	0.04
Selenium	90	0.000182	0.01638	0.0653	0.003	0.0001959	0.05	60	0.3	40	0.003138	0.0004707	1	0.0114	1.495315789	0.8	**1.87**	0.4	**3.74**
Thallium	2.5	0.000182	0.000455	0.0002	0.003	0.0000006	0.05	60	0.1	40	0.003138	0.00021966	1	0.0114	0.059233333	1.2	0.05	0.12	0.49
Uranium	482	0.000182	0.087724	24	0.003	0.072	4.381676	60	7.52	40	0.003138	0.017688924	1	0.0114	15.56253716	1,600	0.01	160	0.10
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	381	0.000182	0.069342	5.48	0.003	0.01644	40	60	152	40	0.003138	0.2661024	1	0.0114	30.86705263	223.5	0.14	10.5	**2.94**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 13. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003			100	0.003138		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000182	0.043498	0.0163	0.003	0.0000489	4	100	0.003138	0.012552	1	0.0114	4.92095614	22.8	0.22	5.7	0.86
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	2.1	100	0.003138	0.0065898	1	0.0114	0.652350877	3.4	0.19	0.85	0.77
Chromium	66	0.000182	0.012012	0.0343	0.003	0.0001029	0.7	100	0.003138	0.0021966	1	0.0114	1.255394737	5	0.25	1	**1.26**
Cobalt	19.9	0.000182	0.0036218	1.1	0.003	0.0033	0.3	100	0.003138	0.0009414	1	0.0114	0.689754386	43.9	0.02	23.1	0.03
Copper	83	0.000182	0.015106	0.286	0.003	0.000858	5	100	0.003138	0.01569	1	0.0114	2.776666667	33.2	0.08	26.9	0.10
Lead	84	0.000182	0.015288	0.0394	0.003	0.0001182	0.5	100	0.003138	0.001569	1	0.0114	1.489052632	15	0.10	1.5	0.99
Manganese	5190	0.000182	0.94458	120	0.003	0.36	610	100	0.003138	1.91418	1	0.0114	282.3473684	9770	0.03	977	0.29
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	NM	100	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.000182	0.008008	2.43	0.003	0.00729	5	100	0.003138	0.01569	1	0.0114	2.718245614	79	0.03	57.2	0.05
Selenium	90	0.000182	0.01638	0.0653	0.003	0.0001959	0.05	100	0.003138	0.0001569	1	0.0114	1.467789474	0.8	**1.83**	0.4	**3.67**
Thallium	2.5	0.000182	0.000455	0.0002	0.003	0.0000006	0.05	100	0.003138	0.0001569	1	0.0114	0.05372807	1.2	0.04	0.12	0.45
Uranium	482	0.000182	0.087724	24	0.003	0.072	4.381676	100	0.003138	0.0137497	1	0.0114	15.21699117	1600	0.01	160	0.10
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	NM	100	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	381	0.000182	0.069342	5.48	0.003	0.01644	40	100	0.003138	0.12552	1	0.0114	18.53526316	223.5	0.08	10.5	**1.77**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PP 13. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00328			0.0128				100	0.00762		1	0.103					
Arsenic	239	0.00328	0.78392	0.0163	0.0128	0.00020864	0.071	16.969	100	0.00762	0.12930378	1	0.103	8.868275922	22.8	0.39	5.7	**1.56**
Cadmium	3.5	0.00328	0.01148	0.07	0.0128	0.000896	69.561	243.4635	100	0.00762	1.85519187	1	0.103	18.13172689	3.4	**5.33**	0.85	**21.33**
Chromium	66	0.00328	0.21648	0.0343	0.0128	0.00043904	0.8	52.8	100	0.00762	0.402336	1	0.103	6.012184854	5	**1.20**	1	**6.01**
Cobalt	19.9	0.00328	0.065272	1.1	0.0128	0.01408	0.18	3.582	100	0.00762	0.02729484	1	0.103	1.035406214	43.9	0.02	23.1	0.04
Copper	83	0.00328	0.27224	0.286	0.0128	0.0036608	1.398	116.034	100	0.00762	0.88417908	1	0.103	11.26291146	33.2	0.34	26.9	0.42
Lead	84	0.00328	0.27552	0.0394	0.0128	0.00050432	2.659	223.356	100	0.00762	1.70197272	1	0.103	19.20385476	15	**1.28**	1.5	**12.80**
Manganese	5190	0.00328	17.0232	120	0.0128	1.536	0.079	410.01	100	0.00762	3.1242762	1	0.103	210.5191864	9770	0.02	977	0.22
Molybdenum	31.9	0.00328	0.104632	NM	0.0128	N/A	1	31.9	100	0.00762	0.243078	1	0.103	3.375825243	35.5	0.10	3.55	0.95
Nickel	44	0.00328	0.14432	2.43	0.0128	0.031104	1.143	50.292	100	0.00762	0.38322504	1	0.103	5.423777087	79	0.07	57.2	0.09
Selenium	90	0.00328	0.2952	0.0653	0.0128	0.00083584	1.754	157.86	100	0.00762	1.2028932	1	0.103	14.55270913	0.8	**18.19**	0.4	**36.38**
Thallium	2.5	0.00328	0.0082	0.0002	0.0128	0.00000256	0.123	0.3075	100	0.00762	0.00234315	1	0.103	0.102385534	1.2	0.09	0.12	0.85
Uranium	482	0.00328	1.58096	24	0.0128	0.3072	1	482	100	0.00762	3.67284	1	0.103	53.99029126	1600	0.03	160	0.34
Vanadium	132	0.00328	0.43296	0.0005	0.0128	0.0000064	0.019	2.508	100	0.00762	0.01911096	1	0.103	4.389100583	114	0.04	11.4	0.39
Zinc	381	0.00328	1.24968	5.48	0.0128	0.070144	16.364	6234.684	100	0.00762	47.5082921	1	0.103	474.0593794	223.5	**2.12**	10.5	**45.15**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 13. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.02023			0.046				100	0.04697		1	0.68					
Arsenic	239	0.02023	4.83497	0.0163	0.046	0.0007498	0.071	16.969	100	0.04697	0.79703393	1	0.68	8.283461368	22.8	0.36	5.7	**1.45**
Cadmium	3.5	0.02023	0.070805	0.07	0.046	0.00322	69.561	243.4635	100	0.04697	11.4354806	1	0.68	16.92574352	3.4	**4.98**	0.85	**19.91**
Chromium	66	0.02023	1.33518	0.0343	0.046	0.0015778	0.8	52.8	100	0.04697	2.480016	1	0.68	5.612902647	5	**1.12**	1	**5.61**
Cobalt	19.9	0.02023	0.402577	1.1	0.046	0.0506	0.18	3.582	100	0.04697	0.16824654	1	0.68	0.913858147	43.9	0.02	23.1	0.04
Copper	83	0.02023	1.67909	0.286	0.046	0.013156	1.398	116.034	100	0.04697	5.45011698	1	0.68	10.50347497	33.2	0.32	26.9	0.39
Lead	84	0.02023	1.69932	0.0394	0.046	0.0018124	2.659	223.356	100	0.04697	10.4910313	1	0.68	17.92965253	15	**1.20**	1.5	**11.95**
Manganese	5190	0.02023	104.9937	120	0.046	5.52	0.079	410.01	100	0.04697	19.2581697	1	0.68	190.8409849	9770	0.02	977	0.20
Molybdenum	31.9	0.02023	0.645337	NM	0.046	N/A	1	31.9	100	0.04697	1.498343	1	0.68	3.152470588	35.5	0.09	3.55	0.89
Nickel	44	0.02023	0.89012	2.43	0.046	0.11178	1.143	50.292	100	0.04697	2.36221524	1	0.68	4.947228294	79	0.06	57.2	0.09
Selenium	90	0.02023	1.8207	0.0653	0.046	0.0030038	1.754	157.86	100	0.04697	7.4146842	1	0.68	13.58586471	0.8	**16.98**	0.4	**33.96**
Thallium	2.5	0.02023	0.050575	0.0002	0.046	0.0000092	0.123	0.3075	100	0.04697	0.01444328	1	0.68	0.09562864	1.2	0.08	0.12	0.80
Uranium	482	0.02023	9.75086	24	0.046	1.104	1	482	100	0.04697	22.63954	1	0.68	49.25647059	1600	0.03	160	0.31
Vanadium	132	0.02023	2.67036	0.0005	0.046	0.000023	0.019	2.508	100	0.04697	0.11780076	1	0.68	4.100270235	114	0.04	11.4	0.36
Zinc	381	0.02023	7.70763	5.48	0.046	0.25208	16.364	6234.684	100	0.04697	292.843107	1	0.68	442.3570845	223.5	**1.98**	10.5	**42.13**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 13. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035			100	0.01841		1	0.45					
Arsenic	239	0.00189	0.45171	0.0163	0.035	0.0005705	4	100	0.01841	0.07364	1	0.45	1.168712222	22.8	0.05	5.7	0.21
Cadmium	3.5	0.00189	0.006615	0.07	0.035	0.00245	2.1	100	0.01841	0.038661	1	0.45	0.106057778	3.4	0.03	0.85	0.12
Chromium	66	0.00189	0.12474	0.0343	0.035	0.0012005	0.7	100	0.01841	0.012887	1	0.45	0.308505556	5	0.06	1	0.31
Cobalt	19.9	0.00189	0.037611	1.1	0.035	0.0385	0.3	100	0.01841	0.005523	1	0.45	0.181408889	43.9	0.00	23.1	0.01
Copper	83	0.00189	0.15687	0.286	0.035	0.01001	5	100	0.01841	0.09205	1	0.45	0.5754	33.2	0.02	26.9	0.02
Lead	84	0.00189	0.15876	0.0394	0.035	0.001379	0.5	100	0.01841	0.009205	1	0.45	0.37632	15	0.03	1.5	0.25
Manganese	5190	0.00189	9.8091	120	0.035	4.2	610	100	0.01841	11.2301	1	0.45	56.08711111	9770	0.01	977	0.06
Molybdenum	31.9	0.00189	0.060291	NM	0.035	N/A	NM	100	0.01841	N/A	1	0.45	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.00189	0.08316	2.43	0.035	0.08505	5	100	0.01841	0.09205	1	0.45	0.578355556	79	0.01	57.2	0.01
Selenium	90	0.00189	0.1701	0.0653	0.035	0.0022855	0.05	100	0.01841	0.0009205	1	0.45	0.385124444	0.8	0.48	0.4	0.96
Thallium	2.5	0.00189	0.004725	0.0002	0.035	0.000007	0.05	100	0.01841	0.0009205	1	0.45	0.012561111	1.2	0.01	0.12	0.10
Uranium	482	0.00189	0.91098	24	0.035	0.84	4.381676	100	0.01841	0.0806667	1	0.45	4.0703259	1600	0.00	160	0.03
Vanadium	132	0.00189	0.24948	0.0005	0.035	0.0000175	NM	100	0.01841	N/A	1	0.45	N/A	114	N/A	11.4	N/A
Zinc	381	0.00189	0.72009	5.48	0.035	0.1918	40	100	0.01841	0.7364	1	0.45	3.662866667	223.5	0.02	10.5	0.35

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PM 13. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0085				100	0.006236		1	0.055					
Arsenic	239	0.000724	0.173036	0.0163	0.0085	0.00013855	0.925	221.075	100	0.006236	1.3786237	1	0.055	28.21451364	22.8	**1.24**	5.7	**4.95**
Cadmium	3.5	0.000724	0.002534	0.07	0.0085	0.000595	190	665	100	0.006236	4.14694	1	0.055	75.4558	3.4	**22.19**	0.85	**88.77**
Chromium	66	0.000724	0.047784	0.0343	0.0085	0.00029155	11.416	753.456	100	0.006236	4.6985516	1	0.055	86.30231211	5	**17.26**	1	**86.30**
Cobalt	19.9	0.000724	0.0144076	1.1	0.0085	0.00935	0.321	6.3879	100	0.006236	0.0398349	1	0.055	1.15622808	43.9	0.03	23.1	0.05
Copper	83	0.000724	0.060092	0.286	0.0085	0.002431	5.492	455.836	100	0.006236	2.8425933	1	0.055	52.82029629	33.2	**1.59**	26.9	**1.96**
Lead	84	0.000724	0.060816	0.0394	0.0085	0.0003349	228.261	19173.924	100	0.006236	119.56859	1	0.055	2175.086199	15	**145.01**	1.5	**1450.06**
Manganese	5190	0.000724	3.75756	120	0.0085	1.02	0.228	1183.32	100	0.006236	7.3791835	1	0.055	221.0317004	9770	0.02	977	0.23
Molybdenum	31.9	0.000724	0.0230956	NM	0.0085	N/A	2.091	66.7029	100	0.006236	0.4159593	1	0.055	7.98281608	35.5	0.22	3.55	**2.25**
Nickel	44	0.000724	0.031856	2.43	0.0085	0.020655	7.802	343.288	100	0.006236	2.140744	1	0.055	39.87736305	79	0.50	57.2	0.70
Selenium	90	0.000724	0.06516	0.0653	0.0085	0.00055505	13.733	1235.97	100	0.006236	7.7075089	1	0.055	141.3313449	0.8	**176.66**	0.4	**353.33**
Thallium	2.5	0.000724	0.00181	0.0002	0.0085	0.0000017	1	2.5	100	0.006236	0.01559	1	0.055	0.316394545	1.2	0.26	0.12	**2.64**
Uranium	482	0.000724	0.348968	24	0.0085	0.204	0.063	30.366	100	0.006236	0.1893624	1	0.055	13.49691593	1600	0.01	160	0.08
Vanadium	132	0.000724	0.095568	0.0005	0.0085	0.00000425	0.088	11.616	100	0.006236	0.0724374	1	0.055	3.054720473	114	0.03	11.4	0.27
Zinc	381	0.000724	0.275844	5.48	0.0085	0.04658	49.51	18863.31	100	0.006236	117.6316	1	0.055	2144.618639	223.5	**9.60**	10.5	**204.25**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 13 . Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	239	0.000142	0.033938	0.0163	0.0061	0.00009943	19	100	0.005778	0.109782	1	0.02	7.1909715	9.63	0.75	1.91	**3.76**
Cadmium	3.5	0.000142	0.000497	0.07	0.0061	0.000427	4	100	0.005778	0.023112	1	0.02	1.2018	2.3	0.52	0.23	**5.23**
Chromium	66	0.000142	0.009372	0.0343	0.0061	0.00020923	16	100	0.005778	0.092448	1	0.02	5.1014615	56.8	0.09	5.68	0.90
Cobalt	19.9	0.000142	0.0028258	1.1	0.0061	0.00671	15	100	0.005778	0.08667	1	0.02	4.81029	20	0.24	5	0.96
Copper	83	0.000142	0.011786	0.286	0.0061	0.0017446	116	100	0.005778	0.670248	1	0.02	34.18893	35.4	0.97	24.3	**1.41**
Lead	84	0.000142	0.011928	0.0394	0.0061	0.00024034	37.9	100	0.005778	0.2189862	1	0.02	11.557727	80	0.14	8	**1.44**
Manganese	5190	0.000142	0.73698	120	0.0061	0.732	1420	100	0.005778	8.20476	1	0.02	483.687	268	**1.80**	83	**5.83**
Molybdenum	31.9	0.000142	0.0045298	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.000142	0.006248	2.43	0.0061	0.014823	26	100	0.005778	0.150228	1	0.02	8.56495	42.1	0.20	23.1	0.37
Selenium	90	0.000142	0.01278	0.0653	0.0061	0.00039833	0.5	100	0.005778	0.002889	1	0.02	0.8033665	0.25	**3.21**	0.025	**32.13**
Thallium	2.5	0.000142	0.000355	0.0002	0.0061	0.00000122	0.4	100	0.005778	0.0023112	1	0.02	0.133371	0.74	0.18	0.074	**1.80**
Uranium	482	0.000142	0.068444	24	0.0061	0.1464	876.09	100	0.005778	5.0620423	1	0.02	263.844315	5	**52.77**	0.5	**527.69**
Vanadium	132	0.000142	0.018744	0.0005	0.0061	0.00000305	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.000142	0.054102	5.48	0.0061	0.033428	147	100	0.005778	0.849366	1	0.02	46.8448	225	0.21	22.5	**2.08**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 19. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	239	0.000142	0.033938	0.0163	0.0061	0.00009943	4	100	0.005778	0.023112	1	0.02	2.8574715	9.63	0.30	1.91	**1.50**
Cadmium	3.5	0.000142	0.000497	0.07	0.0061	0.000427	2.1	100	0.005778	0.0121338	1	0.02	0.65289	2.3	0.28	0.23	**2.84**
Chromium	66	0.000142	0.009372	0.0343	0.0061	0.00020923	0.7	100	0.005778	0.0040446	1	0.02	0.6812915	56.8	0.01	5.68	0.12
Cobalt	19.9	0.000142	0.0028258	1.1	0.0061	0.00671	0.3	100	0.005778	0.0017334	1	0.02	0.56346	20	0.03	5	0.11
Copper	83	0.000142	0.011786	0.286	0.0061	0.0017446	5	100	0.005778	0.02889	1	0.02	2.12103	35.4	0.06	24.3	0.09
Lead	84	0.000142	0.011928	0.0394	0.0061	0.00024034	0.5	100	0.005778	0.002889	1	0.02	0.752867	80	0.01	8	0.09
Manganese	5190	0.000142	0.73698	120	0.0061	0.732	610	100	0.005778	3.52458	1	0.02	249.678	268	0.93	83	**3.01**
Molybdenum	31.9	0.000142	0.0045298	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.000142	0.006248	2.43	0.0061	0.014823	5	100	0.005778	0.02889	1	0.02	2.49805	42.1	0.06	23.1	0.11
Selenium	90	0.000142	0.01278	0.0653	0.0061	0.00039833	0.05	100	0.005778	0.0002889	1	0.02	0.6733615	0.25	**2.69**	0.025	**26.93**
Thallium	2.5	0.000142	0.000355	0.0002	0.0061	0.00000122	0.05	100	0.005778	0.0002889	1	0.02	0.032256	0.74	0.04	0.074	0.44
Uranium	482	0.000142	0.068444	24	0.0061	0.1464	4.38	100	0.005778	0.0253173	1	0.02	12.0080662	5	**2.40**	0.5	**24.02**
Vanadium	132	0.000142	0.018744	0.0005	0.0061	0.00000305	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.000142	0.054102	5.48	0.0061	0.033428	40	100	0.005778	0.23112	1	0.02	15.9325	225	0.07	22.5	0.71

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 13. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.666			13.5			100	1.554		1	22					
Arsenic	239	0.666	159.174	0.0163	13.5	0.22005	4	100	1.554	6.216	1	22	7.527729545	9.63	0.78	1.91	**3.94**
Cadmium	3.5	0.666	2.331	0.07	13.5	0.945	2.1	100	1.554	3.2634	1	22	0.297245455	2.3	0.13	0.23	**1.29**
Chromium	66	0.666	43.956	0.0343	13.5	0.46305	0.7	100	1.554	1.0878	1	22	2.068493182	56.8	0.04	5.68	0.36
Cobalt	19.9	0.666	13.2534	1.1	13.5	14.85	0.3	100	1.554	0.4662	1	22	1.298618182	20	0.06	5	0.26
Copper	83	0.666	55.278	0.286	13.5	3.861	5	100	1.554	7.77	1	22	3.041318182	35.4	0.09	24.3	0.13
Lead	84	0.666	55.944	0.0394	13.5	0.5319	0.5	100	1.554	0.777	1	22	2.602404545	80	0.03	8	0.33
Manganese	5190	0.666	3456.54	120	13.5	1620	610	100	1.554	947.94	1	22	273.84	268	**1.02**	83	**3.30**
Molybdenum	31.9	0.666	21.2454	NM	13.5	N/A	NM	100	1.554	N/A	1	22	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.666	29.304	2.43	13.5	32.805	5	100	1.554	7.77	1	22	3.176318182	42.1	0.08	23.1	0.14
Selenium	90	0.666	59.94	0.0653	13.5	0.88155	0.05	100	1.554	0.0777	1	22	2.768147727	0.25	**11.07**	0.025	**110.73**
Thallium	2.5	0.666	1.665	0.0002	13.5	0.0027	0.05	100	1.554	0.0777	1	22	0.079336364	0.74	0.11	0.074	**1.07**
Uranium	482	0.666	321.012	24	13.5	324	4.381676	100	1.554	6.8091245	1	22	29.62823293	5	**5.93**	0.5	**59.26**
Vanadium	132	0.666	87.912	0.0005	13.5	0.00675	NM	100	1.554	N/A	1	22	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.666	253.746	5.48	13.5	73.98	40	100	1.554	62.16	1	22	17.72209091	225	0.08	22.5	0.79

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 13. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57				100	0.4218		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.0122	2.9158	0.0163	0.57	0.009291	0.071	16.969	100	0.4218	7.1575242	1	7	1.4403736	9.63	0.15	1.91	0.75
Cadmium	3.5	0.0122	0.0427	0.07	0.57	0.0399	69.561	243.4635	100	0.4218	102.692904	1	7	14.6822149	2.3	**6.38**	0.23	**63.84**
Chromium	66	0.0122	0.8052	0.0343	0.57	0.019551	0.8	52.8	100	0.4218	22.27104	1	7	3.299398714	56.8	0.06	5.68	0.58
Cobalt	19.9	0.0122	0.24278	1.1	0.57	0.627	0.18	3.582	100	0.4218	1.5108876	1	7	0.340095371	20	0.02	5	0.07
Copper	83	0.0122	1.0126	0.286	0.57	0.16302	1.398	116.034	100	0.4218	48.9431412	1	7	7.159823029	35.4	0.20	24.3	0.29
Lead	84	0.0122	1.0248	0.0394	0.57	0.022458	2.659	223.356	100	0.4218	94.2115608	1	7	13.60840269	80	0.17	8	**1.70**
Manganese	5190	0.0122	63.318	120	0.57	68.4	0.079	410.01	100	0.4218	172.942218	1	7	43.52288829	268	0.16	83	0.52
Molybdenum	31.9	0.0122	0.38918	NM	0.57	N/A	1	31.9	100	0.4218	13.45542	1	7	1.9778	1.9	**1.04**	0.19	**10.41**
Nickel	44	0.0122	0.5368	2.43	0.57	1.3851	1.143	50.292	100	0.4218	21.2131656	1	7	3.305009371	42.1	0.08	23.1	0.14
Selenium	90	0.0122	1.098	0.0653	0.57	0.037221	1.754	157.86	100	0.4218	66.585348	1	7	9.674367	0.25	**38.70**	0.025	**386.97**
Thallium	2.5	0.0122	0.0305	0.0002	0.57	0.000114	0.123	0.3075	100	0.4218	0.1297035	1	7	0.0229025	0.74	0.03	0.074	0.31
Uranium	482	0.0122	5.8804	24	0.57	13.68	1	482	100	0.4218	203.3076	1	7	31.83828571	5	**6.37**	0.5	**63.68**
Vanadium	132	0.0122	1.6104	0.0005	0.57	0.000285	0.019	2.508	100	0.4218	1.0578744	1	7	0.381222771	2.1	0.18	0.21	**1.82**
Zinc	381	0.0122	4.6482	5.48	0.57	3.1236	16.364	6234.684	100	0.4218	2629.78971	1	7	376.7945016	225	**1.67**	22.5	**16.75**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 13. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00868			0.329				100	0.30132		1	3.8					
Arsenic	239	0.00868	2.07452	0.0163	0.329	0.0053627	0.071	16.969	100	0.30132	5.11309908	1	3.8	1.892889942	9.63	0.20	1.91	0.99
Cadmium	3.5	0.00868	0.03038	0.07	0.329	0.02303	69.561	243.4635	100	0.30132	73.3604218	1	3.8	19.31942943	2.3	**8.40**	0.23	**84.00**
Chromium	66	0.00868	0.57288	0.0343	0.329	0.0112847	0.8	52.8	100	0.30132	15.909696	1	3.8	4.340489658	56.8	0.08	5.68	0.76
Cobalt	19.9	0.00868	0.172732	1.1	0.329	0.3619	0.18	3.582	100	0.30132	1.07932824	1	3.8	0.424726379	20	0.02	5	0.08
Copper	83	0.00868	0.72044	0.286	0.329	0.094094	1.398	116.034	100	0.30132	34.9633649	1	3.8	9.415236547	35.4	0.27	24.3	0.39
Lead	84	0.00868	0.72912	0.0394	0.329	0.0129626	2.659	223.356	100	0.30132	67.3016299	1	3.8	17.90624014	80	0.22	8	**2.24**
Manganese	5190	0.00868	45.0492	120	0.329	39.48	0.079	410.01	100	0.30132	123.544213	1	3.8	54.75616137	268	0.20	83	0.66
Molybdenum	31.9	0.00868	0.276892	NM	0.329	N/A	1	31.9	100	0.30132	9.612108	1	3.8	2.602368421	1.9	**1.37**	0.19	**13.70**
Nickel	44	0.00868	0.38192	2.43	0.329	0.79947	1.143	50.292	100	0.30132	15.1539854	1	3.8	4.298783011	42.1	0.10	23.1	0.19
Selenium	90	0.00868	0.7812	0.0653	0.329	0.0214837	1.754	157.86	100	0.30132	47.5663752	1	3.8	12.72869971	0.25	**50.91**	0.025	**509.15**
Thallium	2.5	0.00868	0.0217	0.0002	0.329	0.0000658	0.123	0.3075	100	0.30132	0.0926559	1	3.8	0.030110974	0.74	0.04	0.074	0.41
Uranium	482	0.00868	4.18376	24	0.329	7.896	1	482	100	0.30132	145.23624	1	3.8	41.39894737	5	**8.28**	0.5	**82.80**
Vanadium	132	0.00868	1.14576	0.0005	0.329	0.0001645	0.019	2.508	100	0.30132	0.75571056	1	3.8	0.500430279	2.1	0.24	0.21	**2.38**
Zinc	381	0.00868	3.30708	5.48	0.329	1.80292	16.364	6234.684	100	0.30132	1878.63498	1	3.8	495.7223639	225	**2.20**	22.5	**22.03**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 13. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000234			0.00157				100	0.004266		1	0.002					
Arsenic	239	0.000234	0.055926	0.0163	0.00157	0.000025591	0.925	221.075	100	0.004266	0.94310595	1	0.002	499.5287705	9.63	**51.87**	1.91	**261.53**
Cadmium	3.5	0.000234	0.000819	0.07	0.00157	0.0001099	190	665	100	0.004266	2.83689	1	0.002	1418.90945	2.3	**616.92**	0.23	**6169.17**
Chromium	66	0.000234	0.015444	0.0343	0.00157	0.000053851	11.416	753.456	100	0.004266	3.2142433	1	0.002	1614.870574	56.8	**28.43**	5.68	**284.31**
Cobalt	19.9	0.000234	0.0046566	1.1	0.00157	0.001727	0.321	6.3879	100	0.004266	0.02725078	1	0.002	16.8171907	20	0.84	5	**3.36**
Copper	83	0.000234	0.019422	0.286	0.00157	0.00044902	5.492	455.836	100	0.004266	1.94459638	1	0.002	982.233698	35.4	**27.75**	24.3	**40.42**
Lead	84	0.000234	0.019656	0.0394	0.00157	0.000061858	228.261	19173.924	100	0.004266	81.7959598	1	0.002	40907.83882	80	**511.35**	8	**5113.48**
Manganese	5190	0.000234	1.21446	120	0.00157	0.1884	0.228	1183.32	100	0.004266	5.04804312	1	0.002	3225.45156	268	**12.04**	83	**38.86**
Molybdenum	31.9	0.000234	0.0074646	NM	0.00157	N/A	2.091	66.7029	100	0.004266	0.28455457	1	0.002	146.0095857	1.9	**76.85**	0.19	**768.47**
Nickel	44	0.000234	0.010296	2.43	0.00157	0.0038151	7.802	343.288	100	0.004266	1.46446661	1	0.002	739.288854	42.1	**17.56**	23.1	**32.00**
Selenium	90	0.000234	0.02106	0.0653	0.00157	0.000102521	13.733	1235.97	100	0.004266	5.27264802	1	0.002	2646.905271	0.25	**10587.62**	0.025	**105876.21**
Thallium	2.5	0.000234	0.000585	0.0002	0.00157	0.000000314	1	2.5	100	0.004266	0.010665	1	0.002	5.625157	0.74	**7.60**	0.074	**76.02**
Uranium	482	0.000234	0.112788	24	0.00157	0.03768	0.063	30.366	100	0.004266	0.12954136	1	0.002	140.004678	5	**28.00**	0.5	**280.01**
Vanadium	132	0.000234	0.030888	0.0005	0.00157	0.000000785	0.088	11.616	100	0.004266	0.04955386	1	0.002	40.2213205	2.1	**19.15**	0.21	**191.53**
Zinc	381	0.000234	0.089154	5.48	0.00157	0.0086036	49.51	18863.31	100	0.004266	80.4708805	1	0.002	40284.31903	225	**179.04**	22.5	**1790.41**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
BAF:	Bioaccumulation factor
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PF 13. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000977			0.00378			58		42	0.005053		1	0.009					
Arsenic	239	0.000977	0.233503	0.0163	0.00378	0.000061614	4	58	2.1	42	0.005053	0.01617971	1	0.009	27.74936889	9.63	**2.88**	1.91	**14.53**
Cadmium	3.5	0.000977	0.0034195	0.07	0.00378	0.0002646	2.1	58	1.3	42	0.005053	0.00891349	1	0.009	1.399732444	2.3	0.61	0.23	**6.09**
Chromium	66	0.000977	0.064482	0.0343	0.00378	0.000129654	0.7	58	2.2	42	0.005053	0.00672049	1	0.009	7.925793778	56.8	0.14	5.68	**1.40**
Cobalt	19.9	0.000977	0.0194423	1.1	0.00378	0.004158	0.3	58	1.26	42	0.005053	0.00355327	1	0.009	3.017063289	20	0.15	5	0.60
Copper	83	0.000977	0.081091	0.286	0.00378	0.00108108	5	58	69.1	42	0.005053	0.16130187	1	0.009	27.05266067	35.4	0.76	24.3	**1.11**
Lead	84	0.000977	0.082068	0.0394	0.00378	0.000148932	0.5	58	3.5	42	0.005053	0.00889328	1	0.009	10.12335689	80	0.13	8	**1.27**
Manganese	5190	0.000977	5.07063	120	0.00378	0.4536	610	58	108	42	0.005053	2.01695548	1	0.009	837.9094978	268	**3.13**	83	**10.10**
Molybdenum	31.9	0.000977	0.0311663	NM	0.00378	N/A	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.000977	0.042988	2.43	0.00378	0.0091854	5	58	2	42	0.005053	0.01889822	1	0.009	7.896846667	42.1	0.19	23.1	0.34
Selenium	90	0.000977	0.08793	0.0653	0.00378	0.000246834	0.05	58	0.3	42	0.005053	0.00078322	1	0.009	9.884449889	0.25	**39.54**	0.025	**395.38**
Thallium	2.5	0.000977	0.0024425	0.0002	0.00378	0.000000756	0.05	58	0.1	42	0.005053	0.00035876	1	0.009	0.311335444	0.74	0.42	0.074	**4.21**
Uranium	482	0.000977	0.470914	24	0.00378	0.09072	4.381676	58	7.52	42	0.005053	0.02880095	1	0.009	65.60388315	5	**13.12**	0.5	**131.21**
Vanadium	132	0.000977	0.128964	0.0005	0.00378	0.00000189	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.000977	0.372237	5.48	0.00378	0.0207144	40	58	152	42	0.005053	0.43981312	1	0.009	92.52939111	225	0.41	22.5	**4.11**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 14. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000538			0.00392			100	0.0122462		1	0.0175					
Arsenic	239	0.0000538	0.0128582	0.0175	0.00392	0.0000686	2.1	100	0.0122462	0.02571702	1	0.0175	2.208218286	22.8	0.10	5.7	0.39
Cadmium	3.5	0.0000538	0.0001883	0.07	0.00392	0.0002744	1.3	100	0.0122462	0.01592006	1	0.0175	0.936157714	3.4	0.28	0.85	**1.10**
Chromium	66	0.0000538	0.0035508	0.0326	0.00392	0.000127792	2.2	100	0.0122462	0.02694164	1	0.0175	1.749727543	5	0.35	1	**1.75**
Cobalt	19.9	0.0000538	0.00107062	1.33	0.00392	0.0052136	1.26	100	0.0122462	0.015430212	1	0.0175	1.240824686	43.9	0.03	23.1	0.05
Copper	83	0.0000538	0.0044654	0.384	0.00392	0.00150528	69.1	100	0.0122462	0.84621242	1	0.0175	48.69617714	33.2	**1.47**	26.9	**1.81**
Lead	84	0.0000538	0.0045192	0.031	0.00392	0.00012152	3.5	100	0.0122462	0.0428617	1	0.0175	2.714424	15	0.18	1.5	**1.81**
Manganese	5190	0.0000538	0.279222	142	0.00392	0.55664	108	100	0.0122462	1.3225896	1	0.0175	123.3400914	9770	0.01	977	0.13
Molybdenum	31.9	0.0000538	0.00171622	NM	0.00392	N/A	NM	100	0.0122462	N/A	1	0.0175	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.0000538	0.0023672	2.76	0.00392	0.0108192	2	100	0.0122462	0.0244924	1	0.0175	2.153074286	79	0.03	57.2	0.04
Selenium	90	0.0000538	0.004842	0.0717	0.00392	0.000281064	0.3	100	0.0122462	0.00367386	1	0.0175	0.502681371	0.8	0.63	0.4	**1.26**
Thallium	2.5	0.0000538	0.0001345	0.00005	0.00392	0.000000196	0.1	100	0.0122462	0.00122462	1	0.0175	0.0776752	1.2	0.06	0.12	0.65
Uranium	482	0.0000538	0.0259316	30	0.00392	0.1176	7.52	100	0.0122462	0.092091424	1	0.0175	13.4641728	1600	0.01	160	0.08
Vanadium	132	0.0000538	0.0071016	0.0005	0.00392	0.00000196	NM	100	0.0122462	N/A	1	0.0175	N/A	114	N/A	11.4	N/A
Zinc	381	0.0000538	0.0204978	6	0.00392	0.02352	152	100	0.0122462	1.8614224	1	0.0175	108.8822971	223.5	0.49	10.5	**10.37**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 14. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000182			0.003			60		40	0.003138		1	0.0114					
Arsenic	239	0.000182	0.043498	0.0175	0.003	0.0000525	4	60	2.1	40	0.003138	0.01016712	1	0.0114	4.71207193	22.8	0.21	5.7	0.83
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	2.1	60	1.3	40	0.003138	0.00558564	1	0.0114	0.564266667	3.4	0.17	0.85	0.66
Chromium	66	0.000182	0.012012	0.0326	0.003	0.0000978	0.7	60	2.2	40	0.003138	0.0040794	1	0.0114	1.420105263	5	0.28	1	**1.42**
Cobalt	19.9	0.000182	0.0036218	1.33	0.003	0.00399	0.3	60	1.26	40	0.003138	0.002146392	1	0.0114	0.855981754	43.9	0.02	23.1	0.04
Copper	83	0.000182	0.015106	0.384	0.003	0.001152	5	60	69.1	40	0.003138	0.09614832	1	0.0114	9.860203509	33.2	0.30	26.9	0.37
Lead	84	0.000182	0.015288	0.031	0.003	0.000093	0.5	60	3.5	40	0.003138	0.0053346	1	0.0114	1.817157895	15	0.12	1.5	**1.21**
Manganese	5190	0.000182	0.94458	142	0.003	0.426	610	60	108	40	0.003138	1.2840696	1	0.0114	232.864	9770	0.02	977	0.24
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.000182	0.008008	2.76	0.003	0.00828	5	60	2	40	0.003138	0.0119244	1	0.0114	2.47477193	79	0.03	57.2	0.04
Selenium	90	0.000182	0.01638	0.0717	0.003	0.0002151	0.05	60	0.3	40	0.003138	0.0004707	1	0.0114	1.497	0.8	**1.87**	0.4	**3.74**
Thallium	2.5	0.000182	0.000455	0.00005	0.003	0.00000015	0.05	60	0.1	40	0.003138	0.00021966	1	0.0114	0.05919386	1.2	0.05	0.12	0.49
Uranium	482	0.000182	0.087724	30	0.003	0.09	4.381676	60	7.52	40	0.003138	0.017688924	1	0.0114	17.14148452	1,600	0.01	160	0.11
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	381	0.000182	0.069342	6	0.003	0.018	40	60	152	40	0.003138	0.2661024	1	0.0114	31.00389474	223.5	0.14	10.5	**2.95**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 14. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000182			0.003			100	0.003138		1	0.0114					
Arsenic	239	0.000182	0.043498	0.0175	0.003	0.0000525	4	100	0.003138	0.012552	1	0.0114	4.92127193	22.8	0.22	5.7	0.86
Cadmium	3.5	0.000182	0.000637	0.07	0.003	0.00021	2.1	100	0.003138	0.0065898	1	0.0114	0.652350877	3.4	0.19	0.85	0.77
Chromium	66	0.000182	0.012012	0.0326	0.003	0.0000978	0.7	100	0.003138	0.0021966	1	0.0114	1.254947368	5	0.25	1	**1.25**
Cobalt	19.9	0.000182	0.0036218	1.33	0.003	0.00399	0.3	100	0.003138	0.0009414	1	0.0114	0.750280702	43.9	0.02	23.1	0.03
Copper	83	0.000182	0.015106	0.384	0.003	0.001152	5	100	0.003138	0.01569	1	0.0114	2.80245614	33.2	0.08	26.9	0.10
Lead	84	0.000182	0.015288	0.031	0.003	0.000093	0.5	100	0.003138	0.001569	1	0.0114	1.486842105	15	0.10	1.5	0.99
Manganese	5190	0.000182	0.94458	142	0.003	0.426	610	100	0.003138	1.91418	1	0.0114	288.1368421	9770	0.03	977	0.29
Molybdenum	31.9	0.000182	0.0058058	NM	0.003	N/A	NM	100	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.000182	0.008008	2.76	0.003	0.00828	5	100	0.003138	0.01569	1	0.0114	2.805087719	79	0.04	57.2	0.05
Selenium	90	0.000182	0.01638	0.0717	0.003	0.0002151	0.05	100	0.003138	0.0001569	1	0.0114	1.469473684	0.8	**1.84**	0.4	**3.67**
Thallium	2.5	0.000182	0.000455	0.00005	0.003	0.00000015	0.05	100	0.003138	0.0001569	1	0.0114	0.053688596	1.2	0.04	0.12	0.45
Uranium	482	0.000182	0.087724	30	0.003	0.09	4.381676	100	0.003138	0.0137497	1	0.0114	16.79593853	1600	0.01	160	0.10
Vanadium	132	0.000182	0.024024	0.0005	0.003	0.0000015	NM	100	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	381	0.000182	0.069342	6	0.003	0.018	40	100	0.003138	0.12552	1	0.0114	18.67210526	223.5	0.08	10.5	**1.78**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 14. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00328			0.0128				100	0.00762		1	0.103					
Arsenic	239	0.00328	0.78392	0.0175	0.0128	0.000224	0.071	16.969	100	0.00762	0.12930378	1	0.103	8.868425049	22.8	0.39	5.7	**1.56**
Cadmium	3.5	0.00328	0.01148	0.07	0.0128	0.000896	69.561	243.4635	100	0.00762	1.85519187	1	0.103	18.13172689	3.4	**5.33**	0.85	**21.33**
Chromium	66	0.00328	0.21648	0.0326	0.0128	0.00041728	0.8	52.8	100	0.00762	0.402336	1	0.103	6.011973592	5	**1.20**	1	**6.01**
Cobalt	19.9	0.00328	0.065272	1.33	0.0128	0.017024	0.18	3.582	100	0.00762	0.02729484	1	0.103	1.063988738	43.9	0.02	23.1	0.05
Copper	83	0.00328	0.27224	0.384	0.0128	0.0049152	1.398	116.034	100	0.00762	0.88417908	1	0.103	11.2750901	33.2	0.34	26.9	0.42
Lead	84	0.00328	0.27552	0.031	0.0128	0.0003968	2.659	223.356	100	0.00762	1.70197272	1	0.103	19.20281087	15	**1.28**	1.5	**12.80**
Manganese	5190	0.00328	17.0232	142	0.0128	1.8176	0.079	410.01	100	0.00762	3.1242762	1	0.103	213.253167	9770	0.02	977	0.22
Molybdenum	31.9	0.00328	0.104632	NM	0.0128	N/A	1	31.9	100	0.00762	0.243078	1	0.103	3.375825243	35.5	0.10	3.55	0.95
Nickel	44	0.00328	0.14432	2.76	0.0128	0.035328	1.143	50.292	100	0.00762	0.38322504	1	0.103	5.464786796	79	0.07	57.2	0.10
Selenium	90	0.00328	0.2952	0.0717	0.0128	0.00091776	1.754	157.86	100	0.00762	1.2028932	1	0.103	14.55350447	0.8	**18.19**	0.4	**36.38**
Thallium	2.5	0.00328	0.0082	0.00005	0.0128	0.00000064	0.123	0.3075	100	0.00762	0.00234315	1	0.103	0.102366893	1.2	0.09	0.12	0.85
Uranium	482	0.00328	1.58096	30	0.0128	0.384	1	482	100	0.00762	3.67284	1	0.103	54.73592233	1600	0.03	160	0.34
Vanadium	132	0.00328	0.43296	0.0005	0.0128	0.0000064	0.019	2.508	100	0.00762	0.01911096	1	0.103	4.389100583	114	0.04	11.4	0.39
Zinc	381	0.00328	1.24968	6	0.0128	0.0768	16.364	6234.684	100	0.00762	47.5082921	1	0.103	474.1240008	223.5	**2.12**	10.5	**45.15**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
BAF:	Bioaccumulation factor
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PO 14. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.02023			0.046				100	0.04697		1	0.68					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.02023	4.83497	0.0175	0.046	0.000805	0.071	16.969	100	0.04697	0.79703393	1	0.68	8.283542544	22.8	0.36	5.7	**1.45**
Cadmium	3.5	0.02023	0.070805	0.07	0.046	0.00322	69.561	243.4635	100	0.04697	11.4354806	1	0.68	16.92574352	3.4	**4.98**	0.85	**19.91**
Chromium	66	0.02023	1.33518	0.0326	0.046	0.0014996	0.8	52.8	100	0.04697	2.480016	1	0.68	5.612787647	5	**1.12**	1	**5.61**
Cobalt	19.9	0.02023	0.402577	1.33	0.046	0.06118	0.18	3.582	100	0.04697	0.16824654	1	0.68	0.929416971	43.9	0.02	23.1	0.04
Copper	83	0.02023	1.67909	0.384	0.046	0.017664	1.398	116.034	100	0.04697	5.45011698	1	0.68	10.51010438	33.2	0.32	26.9	0.39
Lead	84	0.02023	1.69932	0.031	0.046	0.001426	2.659	223.356	100	0.04697	10.4910313	1	0.68	17.92908429	15	**1.20**	1.5	**11.95**
Manganese	5190	0.02023	104.9937	142	0.046	6.532	0.079	410.01	100	0.04697	19.2581697	1	0.68	192.3292201	9770	0.02	977	0.20
Molybdenum	31.9	0.02023	0.645337	NM	0.046	N/A	1	31.9	100	0.04697	1.498343	1	0.68	3.152470588	35.5	0.09	3.55	0.89
Nickel	44	0.02023	0.89012	2.76	0.046	0.12696	1.143	50.292	100	0.04697	2.36221524	1	0.68	4.969551824	79	0.06	57.2	0.09
Selenium	90	0.02023	1.8207	0.0717	0.046	0.0032982	1.754	157.86	100	0.04697	7.4146842	1	0.68	13.58629765	0.8	**16.98**	0.4	**33.97**
Thallium	2.5	0.02023	0.050575	0.00005	0.046	0.0000023	0.123	0.3075	100	0.04697	0.01444328	1	0.68	0.095618493	1.2	0.08	0.12	0.80
Uranium	482	0.02023	9.75086	30	0.046	1.38	1	482	100	0.04697	22.63954	1	0.68	49.66235294	1600	0.03	160	0.31
Vanadium	132	0.02023	2.67036	0.0005	0.046	0.000023	0.019	2.508	100	0.04697	0.11780076	1	0.68	4.100270235	114	0.04	11.4	0.36
Zinc	381	0.02023	7.70763	6	0.046	0.276	16.364	6234.684	100	0.04697	292.843107	1	0.68	442.392261	223.5	**1.98**	10.5	**42.13**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 14. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035			100	0.01841		1	0.45					
Arsenic	239	0.00189	0.45171	0.0175	0.035	0.0006125	4	100	0.01841	0.07364	1	0.45	1.168805556	22.8	0.05	5.7	0.21
Cadmium	3.5	0.00189	0.006615	0.07	0.035	0.00245	2.1	100	0.01841	0.038661	1	0.45	0.106057778	3.4	0.03	0.85	0.12
Chromium	66	0.00189	0.12474	0.0326	0.035	0.001141	0.7	100	0.01841	0.012887	1	0.45	0.308373333	5	0.06	1	0.31
Cobalt	19.9	0.00189	0.037611	1.33	0.035	0.04655	0.3	100	0.01841	0.005523	1	0.45	0.199297778	43.9	0.00	23.1	0.01
Copper	83	0.00189	0.15687	0.384	0.035	0.01344	5	100	0.01841	0.09205	1	0.45	0.583022222	33.2	0.02	26.9	0.02
Lead	84	0.00189	0.15876	0.031	0.035	0.001085	0.5	100	0.01841	0.009205	1	0.45	0.375666667	15	0.03	1.5	0.25
Manganese	5190	0.00189	9.8091	142	0.035	4.97	610	100	0.01841	11.2301	1	0.45	57.79822222	9770	0.01	977	0.06
Molybdenum	31.9	0.00189	0.060291	NM	0.035	N/A	NM	100	0.01841	N/A	1	0.45	N/A	35.5	N/A	3.55	N/A
Nickel	44	0.00189	0.08316	2.76	0.035	0.0966	5	100	0.01841	0.09205	1	0.45	0.604022222	79	0.01	57.2	0.01
Selenium	90	0.00189	0.1701	0.0717	0.035	0.0025095	0.05	100	0.01841	0.0009205	1	0.45	0.385622222	0.8	0.48	0.4	0.96
Thallium	2.5	0.00189	0.004725	0.00005	0.035	0.00000175	0.05	100	0.01841	0.0009205	1	0.45	0.012549444	1.2	0.01	0.12	0.10
Uranium	482	0.00189	0.91098	30	0.035	1.05	4.381676	100	0.01841	0.0806667	1	0.45	4.536992567	1600	0.00	160	0.03
Vanadium	132	0.00189	0.24948	0.0005	0.035	0.0000175	NM	100	0.01841	N/A	1	0.45	N/A	114	N/A	11.4	N/A
Zinc	381	0.00189	0.72009	6	0.035	0.21	40	100	0.01841	0.7364	1	0.45	3.703311111	223.5	0.02	10.5	0.35

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 14. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0085				100	0.006236		1	0.055					
Arsenic	239	0.000724	0.173036	0.0175	0.0085	0.00014875	0.925	221.075	100	0.006236	1.3786237	1	0.055	28.21469909	22.8	**1.24**	5.7	**4.95**
Cadmium	3.5	0.000724	0.002534	0.07	0.0085	0.000595	190	665	100	0.006236	4.14694	1	0.055	75.4558	3.4	**22.19**	0.85	**88.77**
Chromium	66	0.000724	0.047784	0.0326	0.0085	0.0002771	11.416	753.456	100	0.006236	4.6985516	1	0.055	86.30204938	5	**17.26**	1	**86.30**
Cobalt	19.9	0.000724	0.0144076	1.33	0.0085	0.011305	0.321	6.3879	100	0.006236	0.0398349	1	0.055	1.191773535	43.9	0.03	23.1	0.05
Copper	83	0.000724	0.060092	0.384	0.0085	0.003264	5.492	455.836	100	0.006236	2.8425933	1	0.055	52.83544175	33.2	**1.59**	26.9	**1.96**
Lead	84	0.000724	0.060816	0.031	0.0085	0.0002635	228.261	19173.924	100	0.006236	119.56859	1	0.055	2175.084901	15	**145.01**	1.5	**1450.06**
Manganese	5190	0.000724	3.75756	142	0.0085	1.207	0.228	1183.32	100	0.006236	7.3791835	1	0.055	224.4317004	9770	0.02	977	0.23
Molybdenum	31.9	0.000724	0.0230956	NM	0.0085	N/A	2.091	66.7029	100	0.006236	0.4159593	1	0.055	7.98281608	35.5	0.22	3.55	**2.25**
Nickel	44	0.000724	0.031856	2.76	0.0085	0.02346	7.802	343.288	100	0.006236	2.140744	1	0.055	39.92836305	79	0.51	57.2	0.70
Selenium	90	0.000724	0.06516	0.0717	0.0085	0.00060945	13.733	1235.97	100	0.006236	7.7075089	1	0.055	141.332334	0.8	**176.67**	0.4	**353.33**
Thallium	2.5	0.000724	0.00181	0.00005	0.0085	0.000000425	1	2.5	100	0.006236	0.01559	1	0.055	0.316371364	1.2	0.26	0.12	**2.64**
Uranium	482	0.000724	0.348968	30	0.0085	0.255	0.063	30.366	100	0.006236	0.1893624	1	0.055	14.42418865	1600	0.01	160	0.09
Vanadium	132	0.000724	0.095568	0.0005	0.0085	0.00000425	0.088	11.616	100	0.006236	0.0724374	1	0.055	3.054720473	114	0.03	11.4	0.27
Zinc	381	0.000724	0.275844	6	0.0085	0.051	49.51	18863.31	100	0.006236	117.6316	1	0.055	2144.699003	223.5	**9.60**	10.5	**204.26**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 14. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	239	0.000142	0.033938	0.0175	0.0061	0.00010675	19	100	0.005778	0.109782	1	0.02	7.1913375	9.63	0.75	1.91	**3.77**
Cadmium	3.5	0.000142	0.000497	0.07	0.0061	0.000427	4	100	0.005778	0.023112	1	0.02	1.2018	2.3	0.52	0.23	**5.23**
Chromium	66	0.000142	0.009372	0.0326	0.0061	0.00019886	16	100	0.005778	0.092448	1	0.02	5.100943	56.8	0.09	5.68	0.90
Cobalt	19.9	0.000142	0.0028258	1.33	0.0061	0.008113	15	100	0.005778	0.08667	1	0.02	4.88044	20	0.24	5	0.98
Copper	83	0.000142	0.011786	0.384	0.0061	0.0023424	116	100	0.005778	0.670248	1	0.02	34.21882	35.4	0.97	24.3	**1.41**
Lead	84	0.000142	0.011928	0.031	0.0061	0.0001891	37.9	100	0.005778	0.2189862	1	0.02	11.555165	80	0.14	8	**1.44**
Manganese	5190	0.000142	0.73698	142	0.0061	0.8662	1420	100	0.005778	8.20476	1	0.02	490.397	268	**1.83**	83	**5.91**
Molybdenum	31.9	0.000142	0.0045298	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.000142	0.006248	2.76	0.0061	0.016836	26	100	0.005778	0.150228	1	0.02	8.6656	42.1	0.21	23.1	0.38
Selenium	90	0.000142	0.01278	0.0717	0.0061	0.00043737	0.5	100	0.005778	0.002889	1	0.02	0.8053185	0.25	**3.22**	0.025	**32.21**
Thallium	2.5	0.000142	0.000355	0.00005	0.0061	0.000000305	0.4	100	0.005778	0.0023112	1	0.02	0.13332525	0.74	0.18	0.074	**1.80**
Uranium	482	0.000142	0.068444	30	0.0061	0.183	876.08901	100	0.005778	5.0620423	1	0.02	265.674315	5	**53.13**	0.5	**531.35**
Vanadium	132	0.000142	0.018744	0.0005	0.0061	0.00000305	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.000142	0.054102	6	0.0061	0.0366	147	100	0.005778	0.849366	1	0.02	47.0034	225	0.21	22.5	**2.09**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 20. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	239	0.000142	0.033938	0.0175	0.0061	0.00010675	4	100	0.005778	0.023112	1	0.02	2.8578375	9.63	0.30	1.91	**1.50**
Cadmium	3.5	0.000142	0.000497	0.07	0.0061	0.000427	2.1	100	0.005778	0.0121338	1	0.02	0.65289	2.3	0.28	0.23	**2.84**
Chromium	66	0.000142	0.009372	0.0326	0.0061	0.00019886	0.7	100	0.005778	0.0040446	1	0.02	0.680773	56.8	0.01	5.68	0.12
Cobalt	19.9	0.000142	0.0028258	1.33	0.0061	0.008113	0.3	100	0.005778	0.0017334	1	0.02	0.63361	20	0.03	5	0.13
Copper	83	0.000142	0.011786	0.384	0.0061	0.0023424	5	100	0.005778	0.02889	1	0.02	2.15092	35.4	0.06	24.3	0.09
Lead	84	0.000142	0.011928	0.031	0.0061	0.0001891	0.5	100	0.005778	0.002889	1	0.02	0.750305	80	0.01	8	0.09
Manganese	5190	0.000142	0.73698	142	0.0061	0.8662	610	100	0.005778	3.52458	1	0.02	256.388	268	0.96	83	**3.09**
Molybdenum	31.9	0.000142	0.0045298	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.000142	0.006248	2.76	0.0061	0.016836	5	100	0.005778	0.02889	1	0.02	2.5987	42.1	0.06	23.1	0.11
Selenium	90	0.000142	0.01278	0.0717	0.0061	0.00043737	0.05	100	0.005778	0.0002889	1	0.02	0.6753135	0.25	**2.70**	0.025	**27.01**
Thallium	2.5	0.000142	0.000355	0.00005	0.0061	0.000000305	0.05	100	0.005778	0.0002889	1	0.02	0.03221025	0.74	0.04	0.074	0.44
Uranium	482	0.000142	0.068444	30	0.0061	0.183	4.381676	100	0.005778	0.0253173	1	0.02	13.8380662	5	**2.77**	0.5	**27.68**
Vanadium	132	0.000142	0.018744	0.0005	0.0061	0.00000305	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.000142	0.054102	6	0.0061	0.0366	40	100	0.005778	0.23112	1	0.02	16.0911	225	0.07	22.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 14. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5			100	1.554		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.666	159.174	0.0175	13.5	0.23625	4	100	1.554	6.216	1	22	7.528465909	9.63	0.78	1.91	**3.94**
Cadmium	3.5	0.666	2.331	0.07	13.5	0.945	2.1	100	1.554	3.2634	1	22	0.297245455	2.3	0.13	0.23	**1.29**
Chromium	66	0.666	43.956	0.0326	13.5	0.4401	0.7	100	1.554	1.0878	1	22	2.06745	56.8	0.04	5.68	0.36
Cobalt	19.9	0.666	13.2534	1.33	13.5	17.955	0.3	100	1.554	0.4662	1	22	1.439754545	20	0.07	5	0.29
Copper	83	0.666	55.278	0.384	13.5	5.184	5	100	1.554	7.77	1	22	3.101454545	35.4	0.09	24.3	0.13
Lead	84	0.666	55.944	0.031	13.5	0.4185	0.5	100	1.554	0.777	1	22	2.59725	80	0.03	8	0.32
Manganese	5190	0.666	3456.54	142	13.5	1917	610	100	1.554	947.94	1	22	287.34	268	**1.07**	83	**3.46**
Molybdenum	31.9	0.666	21.2454	NM	13.5	N/A	NM	100	1.554	N/A	1	22	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.666	29.304	2.76	13.5	37.26	5	100	1.554	7.77	1	22	3.378818182	42.1	0.08	23.1	0.15
Selenium	90	0.666	59.94	0.0717	13.5	0.96795	0.05	100	1.554	0.0777	1	22	2.772075	0.25	**11.09**	0.025	**110.88**
Thallium	2.5	0.666	1.665	0.00005	13.5	0.000675	0.05	100	1.554	0.0777	1	22	0.079244318	0.74	0.11	0.074	**1.07**
Uranium	482	0.666	321.012	30	13.5	405	4.381676	100	1.554	6.8091245	1	22	33.31005111	5	**6.66**	0.5	**66.62**
Vanadium	132	0.666	87.912	0.0005	13.5	0.00675	NM	100	1.554	N/A	1	22	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.666	253.746	6	13.5	81	40	100	1.554	62.16	1	22	18.04118182	225	0.08	22.5	0.80

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 14. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0122			0.57				100	0.4218		1	7					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.0122	2.9158	0.0175	0.57	0.009975	0.071	16.969	100	0.4218	7.1575242	1	7	1.440471314	9.63	0.15	1.91	0.75
Cadmium	3.5	0.0122	0.0427	0.07	0.57	0.0399	69.561	243.4635	100	0.4218	102.692904	1	7	14.6822149	2.3	**6.38**	0.23	**63.84**
Chromium	66	0.0122	0.8052	0.0326	0.57	0.018582	0.8	52.8	100	0.4218	22.27104	1	7	3.299260286	56.8	0.06	5.68	0.58
Cobalt	19.9	0.0122	0.24278	1.33	0.57	0.7581	0.18	3.582	100	0.4218	1.5108876	1	7	0.358823943	20	0.02	5	0.07
Copper	83	0.0122	1.0126	0.384	0.57	0.21888	1.398	116.034	100	0.4218	48.9431412	1	7	7.167803029	35.4	0.20	24.3	0.29
Lead	84	0.0122	1.0248	0.031	0.57	0.01767	2.659	223.356	100	0.4218	94.2115608	1	7	13.60771869	80	0.17	8	**1.70**
Manganese	5190	0.0122	63.318	142	0.57	80.94	0.079	410.01	100	0.4218	172.942218	1	7	45.31431686	268	0.17	83	0.55
Molybdenum	31.9	0.0122	0.38918	NM	0.57	N/A	1	31.9	100	0.4218	13.45542	1	7	1.9778	1.9	**1.04**	0.19	**10.41**
Nickel	44	0.0122	0.5368	2.76	0.57	1.5732	1.143	50.292	100	0.4218	21.2131656	1	7	3.3318808	42.1	0.08	23.1	0.14
Selenium	90	0.0122	1.098	0.0717	0.57	0.040869	1.754	157.86	100	0.4218	66.585348	1	7	9.674888143	0.25	**38.70**	0.025	**387.00**
Thallium	2.5	0.0122	0.0305	0.00005	0.57	0.0000285	0.123	0.3075	100	0.4218	0.1297035	1	7	0.022890286	0.74	0.03	0.074	0.31
Uranium	482	0.0122	5.8804	30	0.57	17.1	1	482	100	0.4218	203.3076	1	7	32.32685714	5	**6.47**	0.5	**64.65**
Vanadium	132	0.0122	1.6104	0.0005	0.57	0.000285	0.019	2.508	100	0.4218	1.0578744	1	7	0.381222771	2.1	0.18	0.21	**1.82**
Zinc	381	0.0122	4.6482	6	0.57	3.42	16.364	6234.684	100	0.4218	2629.78971	1	7	376.8368445	225	**1.67**	22.5	**16.75**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 14. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329				100	0.30132		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.00868	2.07452	0.0175	0.329	0.0057575	0.071	16.969	100	0.30132	5.11309908	1	3.8	1.892993837	9.63	0.20	1.91	0.99
Cadmium	3.5	0.00868	0.03038	0.07	0.329	0.02303	69.561	243.4635	100	0.30132	73.3604218	1	3.8	19.31942943	2.3	**8.40**	0.23	**84.00**
Chromium	66	0.00868	0.57288	0.0326	0.329	0.0107254	0.8	52.8	100	0.30132	15.909696	1	3.8	4.340342474	56.8	0.08	5.68	0.76
Cobalt	19.9	0.00868	0.172732	1.33	0.329	0.43757	0.18	3.582	100	0.30132	1.07932824	1	3.8	0.444639537	20	0.02	5	0.09
Copper	83	0.00868	0.72044	0.384	0.329	0.126336	1.398	116.034	100	0.30132	34.9633649	1	3.8	9.423721284	35.4	0.27	24.3	0.39
Lead	84	0.00868	0.72912	0.031	0.329	0.010199	2.659	223.356	100	0.30132	67.3016299	1	3.8	17.90551287	80	0.22	8	**2.24**
Manganese	5190	0.00868	45.0492	142	0.329	46.718	0.079	410.01	100	0.30132	123.544213	1	3.8	56.66089821	268	0.21	83	0.68
Molybdenum	31.9	0.00868	0.276892	NM	0.329	N/A	1	31.9	100	0.30132	9.612108	1	3.8	2.602368421	1.9	**1.37**	0.19	**13.70**
Nickel	44	0.00868	0.38192	2.76	0.329	0.90804	1.143	50.292	100	0.30132	15.1539854	1	3.8	4.327354063	42.1	0.10	23.1	0.19
Selenium	90	0.00868	0.7812	0.0717	0.329	0.0235893	1.754	157.86	100	0.30132	47.5663752	1	3.8	12.72925382	0.25	**50.92**	0.025	**509.17**
Thallium	2.5	0.00868	0.0217	0.00005	0.329	0.00001645	0.123	0.3075	100	0.30132	0.0926559	1	3.8	0.030097987	0.74	0.04	0.074	0.41
Uranium	482	0.00868	4.18376	30	0.329	9.87	1	482	100	0.30132	145.23624	1	3.8	41.91842105	5	**8.38**	0.5	**83.84**
Vanadium	132	0.00868	1.14576	0.0005	0.329	0.0001645	0.019	2.508	100	0.30132	0.75571056	1	3.8	0.500430279	2.1	0.24	0.21	**2.38**
Zinc	381	0.00868	3.30708	6	0.329	1.974	16.364	6234.684	100	0.30132	1878.63498	1	3.8	495.767385	225	**2.20**	22.5	**22.03**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 14. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000234			0.00157				100	0.004266		1	0.002					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	239	0.000234	0.055926	0.0175	0.00157	0.000027475	0.925	221.075	100	0.004266	0.94310595	1	0.002	499.5297125	9.63	**51.87**	1.91	**261.53**
Cadmium	3.5	0.000234	0.000819	0.07	0.00157	0.0001099	190	665	100	0.004266	2.83689	1	0.002	1418.90945	2.3	**616.92**	0.23	**6169.17**
Chromium	66	0.000234	0.015444	0.0326	0.00157	0.000051182	11.416	753.456	100	0.004266	3.2142433	1	0.002	1614.869239	56.8	**28.43**	5.68	**284.31**
Cobalt	19.9	0.000234	0.0046566	1.33	0.00157	0.0020881	0.321	6.3879	100	0.004266	0.02725078	1	0.002	16.9977407	20	0.85	5	**3.40**
Copper	83	0.000234	0.019422	0.384	0.00157	0.00060288	5.492	455.836	100	0.004266	1.94459638	1	0.002	982.310628	35.4	**27.75**	24.3	**40.42**
Lead	84	0.000234	0.019656	0.031	0.00157	0.00004867	228.261	19173.924	100	0.004266	81.7959598	1	0.002	40907.83223	80	**511.35**	8	**5113.48**
Manganese	5190	0.000234	1.21446	142	0.00157	0.22294	0.228	1183.32	100	0.004266	5.04804312	1	0.002	3242.72156	268	**12.10**	83	**39.07**
Molybdenum	31.9	0.000234	0.0074646	NM	0.00157	N/A	2.091	66.7029	100	0.004266	0.28455457	1	0.002	146.0095857	1.9	**76.85**	0.19	**768.47**
Nickel	44	0.000234	0.010296	2.76	0.00157	0.0043332	7.802	343.288	100	0.004266	1.46446661	1	0.002	739.547904	42.1	**17.57**	23.1	**32.02**
Selenium	90	0.000234	0.02106	0.0717	0.00157	0.000112569	13.733	1235.97	100	0.004266	5.27264802	1	0.002	2646.910295	0.25	**10587.64**	0.025	**105876.41**
Thallium	2.5	0.000234	0.000585	0.00005	0.00157	7.85E-08	1	2.5	100	0.004266	0.010665	1	0.002	5.62503925	0.74	**7.60**	0.074	**76.01**
Uranium	482	0.000234	0.112788	30	0.00157	0.0471	0.063	30.366	100	0.004266	0.12954136	1	0.002	144.714678	5	**28.94**	0.5	**289.43**
Vanadium	132	0.000234	0.030888	0.0005	0.00157	0.000000785	0.088	11.616	100	0.004266	0.04955386	1	0.002	40.2213205	2.1	**19.15**	0.21	**191.53**
Zinc	381	0.000234	0.089154	6	0.00157	0.00942	49.51	18863.31	100	0.004266	80.4708805	1	0.002	40284.72723	225	**179.04**	22.5	**1790.43**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 14. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000977			0.00378			58		42	0.005053		1	0.009					
Arsenic	239	0.000977	0.233503	0.0175	0.00378	0.00006615	4	58	2.1	42	0.005053	0.01617971	1	0.009	27.74987289	9.63	**2.88**	1.91	**14.53**
Cadmium	3.5	0.000977	0.0034195	0.07	0.00378	0.0002646	2.1	58	1.3	42	0.005053	0.00891349	1	0.009	1.399732444	2.3	0.61	0.23	**6.09**
Chromium	66	0.000977	0.064482	0.0326	0.00378	0.000123228	0.7	58	2.2	42	0.005053	0.00672049	1	0.009	7.925079778	56.8	0.14	5.68	**1.40**
Cobalt	19.9	0.000977	0.0194423	1.33	0.00378	0.0050274	0.3	58	1.26	42	0.005053	0.00355327	1	0.009	3.113663289	20	0.16	5	0.62
Copper	83	0.000977	0.081091	0.384	0.00378	0.00145152	5	58	69.1	42	0.005053	0.16130187	1	0.009	27.09382067	35.4	0.77	24.3	**1.11**
Lead	84	0.000977	0.082068	0.031	0.00378	0.00011718	0.5	58	3.5	42	0.005053	0.00889328	1	0.009	10.11982889	80	0.13	8	**1.26**
Manganese	5190	0.000977	5.07063	142	0.00378	0.53676	610	58	108	42	0.005053	2.01695548	1	0.009	847.1494978	268	**3.16**	83	**10.21**
Molybdenum	31.9	0.000977	0.0311663	NM	0.00378	N/A	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	1.9	N/A	0.19	N/A
Nickel	44	0.000977	0.042988	2.76	0.00378	0.0104328	5	58	2	42	0.005053	0.01889822	1	0.009	8.035446667	42.1	0.19	23.1	0.35
Selenium	90	0.000977	0.08793	0.0717	0.00378	0.000271026	0.05	58	0.3	42	0.005053	0.00078322	1	0.009	9.887137889	0.25	**39.55**	0.025	**395.49**
Thallium	2.5	0.000977	0.0024425	0.00005	0.00378	0.000000189	0.05	58	0.1	42	0.005053	0.00035876	1	0.009	0.311272444	0.74	0.42	0.074	**4.21**
Uranium	482	0.000977	0.470914	30	0.00378	0.1134	4.381676	58	7.52	42	0.005053	0.02880095	1	0.009	68.12388315	5	**13.62**	0.5	**136.25**
Vanadium	132	0.000977	0.128964	0.0005	0.00378	0.00000189	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	2.1	N/A	0.21	N/A
Zinc	381	0.000977	0.372237	6	0.00378	0.02268	40	58	152	42	0.005053	0.43981312	1	0.009	92.74779111	225	0.41	22.5	**4.12**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 15. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000538			0.00392			100	0.0122462		1	0.0175					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.0000538	0.0027169	0.0093	0.00392	0.000036456	2.1	100	0.0122462	0.02571702	1	0.0175	1.626878629	22.8	0.07	5.7	0.29
Cadmium	0.8	0.0000538	0.00004304	0.0044	0.00392	0.000017248	1.3	100	0.0122462	0.01592006	1	0.0175	0.913162743	3.4	0.27	0.85	**1.07**
Chromium	29.1	0.0000538	0.00156558	0.0169	0.00392	0.000066248	2.2	100	0.0122462	0.02694164	1	0.0175	1.6327696	5	0.33	1	**1.63**
Cobalt	15.7	0.0000538	0.00084466	0.0024	0.00392	0.000009408	1.26	100	0.0122462	0.015430212	1	0.0175	0.930530286	43.9	0.02	23.1	0.04
Copper	32.2	0.0000538	0.00173236	0.051	0.00392	0.00019992	69.1	100	0.0122462	0.84621242	1	0.0175	48.46541143	33.2	**1.46**	26.9	**1.80**
Lead	27.1	0.0000538	0.00145798	0.0059	0.00392	0.000023128	3.5	100	0.0122462	0.0428617	1	0.0175	2.533874743	15	0.17	1.5	**1.69**
Manganese	1990	0.0000538	0.107062	15.9	0.00392	0.062328	108	100	0.0122462	1.3225896	1	0.0175	85.25597714	9770	0.01	977	0.09
Molybdenum	1.6	0.0000538	0.00008608	NM	0.00392	N/A	NM	100	0.0122462	N/A	1	0.0175	N/A	35.5	N/A	3.55	N/A
Nickel	21.7	0.0000538	0.00116746	0.32	0.00392	0.0012544	2	100	0.0122462	0.0244924	1	0.0175	1.537957714	79	0.02	57.2	0.03
Selenium	0.085	0.0000538	0.000004573	0.0005	0.00392	0.00000196	0.3	100	0.0122462	0.00367386	1	0.0175	0.210308171	0.8	0.26	0.4	0.53
Thallium	0.2	0.0000538	0.00001076	0.0015	0.00392	0.00000588	0.1	100	0.0122462	0.00122462	1	0.0175	0.070929143	1.2	0.06	0.12	0.59
Uranium	15.3	0.0000538	0.00082314	0.13	0.00392	0.0005096	7.52	100	0.0122462	0.092091424	1	0.0175	5.338523657	1600	0.00	160	0.03
Vanadium	49.6	0.0000538	0.00266848	0.0082	0.00392	0.000032144	NM	100	0.0122462	N/A	1	0.0175	N/A	114	N/A	11.4	N/A
Zinc	116	0.0000538	0.0062408	0.38	0.00392	0.0014896	152	100	0.0122462	1.8614224	1	0.0175	106.8087314	223.5	0.48	10.5	**10.17**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 15. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003			60		40	0.003138		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000182	0.009191	0.0093	0.003	0.0000279	4	60	2.1	40	0.003138	0.01016712	1	0.0114	1.70052807	22.8	0.07	5.7	0.30
Cadmium	0.8	0.000182	0.0001456	0.0044	0.003	0.0000132	2.1	60	1.3	40	0.003138	0.00558564	1	0.0114	0.503898246	3.4	0.15	0.85	0.59
Chromium	29.1	0.000182	0.0052962	0.0169	0.003	0.0000507	0.7	60	2.2	40	0.003138	0.0040794	1	0.0114	0.826868421	5	0.17	1	0.83
Cobalt	15.7	0.000182	0.0028574	0.0024	0.003	0.0000072	0.3	60	1.26	40	0.003138	0.002146392	1	0.0114	0.439560702	43.9	0.01	23.1	0.02
Copper	32.2	0.000182	0.0058604	0.051	0.003	0.000153	5	60	69.1	40	0.003138	0.09614832	1	0.0114	8.961554386	33.2	0.27	26.9	0.33
Lead	27.1	0.000182	0.0049322	0.0059	0.003	0.0000177	0.5	60	3.5	40	0.003138	0.0053346	1	0.0114	0.902149123	15	0.06	1.5	0.60
Manganese	1990	0.000182	0.36218	15.9	0.003	0.0477	610	60	108	40	0.003138	1.2840696	1	0.0114	148.5920702	9770	0.02	977	0.15
Molybdenum	1.6	0.000182	0.0002912	NM	0.003	N/A	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	21.7	0.000182	0.0039494	0.32	0.003	0.00096	5	60	2	40	0.003138	0.0119244	1	0.0114	1.476649123	79	0.02	57.2	0.03
Selenium	0.085	0.000182	0.00001547	0.0005	0.003	0.0000015	0.05	60	0.3	40	0.003138	0.0004707	1	0.0114	0.04277807	0.8	0.05	0.4	0.11
Thallium	0.2	0.000182	0.0000364	0.0015	0.003	0.0000045	0.05	60	0.1	40	0.003138	0.00021966	1	0.0114	0.02285614	1.2	0.02	0.12	0.19
Uranium	15.3	0.000182	0.0027846	0.13	0.003	0.00039	4.381676	60	7.52	40	0.003138	0.017688924	1	0.0114	1.830133647	1,600	0.00	160	0.01
Vanadium	49.6	0.000182	0.0090272	0.0082	0.003	0.0000246	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	116	0.000182	0.021112	0.38	0.003	0.00114	40	60	152	40	0.003138	0.2661024	1	0.0114	25.29424561	223.5	0.11	10.5	**2.41**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 15. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003			100	0.003138		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000182	0.009191	0.0093	0.003	0.0000279	4	100	0.003138	0.012552	1	0.0114	1.90972807	22.8	0.08	5.7	0.34
Cadmium	0.8	0.000182	0.0001456	0.0044	0.003	0.0000132	2.1	100	0.003138	0.0065898	1	0.0114	0.591982456	3.4	0.17	0.85	0.70
Chromium	29.1	0.000182	0.0052962	0.0169	0.003	0.0000507	0.7	100	0.003138	0.0021966	1	0.0114	0.661710526	5	0.13	1	0.66
Cobalt	15.7	0.000182	0.0028574	0.0024	0.003	0.0000072	0.3	100	0.003138	0.0009414	1	0.0114	0.333859649	43.9	0.01	23.1	0.01
Copper	32.2	0.000182	0.0058604	0.051	0.003	0.000153	5	100	0.003138	0.01569	1	0.0114	1.903807018	33.2	0.06	26.9	0.07
Lead	27.1	0.000182	0.0049322	0.0059	0.003	0.0000177	0.5	100	0.003138	0.001569	1	0.0114	0.571833333	15	0.04	1.5	0.38
Manganese	1990	0.000182	0.36218	15.9	0.003	0.0477	610	100	0.003138	1.91418	1	0.0114	203.8649123	9770	0.02	977	0.21
Molybdenum	1.6	0.000182	0.0002912	NM	0.003	N/A	NM	100	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	21.7	0.000182	0.0039494	0.32	0.003	0.00096	5	100	0.003138	0.01569	1	0.0114	1.806964912	79	0.02	57.2	0.03
Selenium	0.085	0.000182	0.00001547	0.0005	0.003	0.0000015	0.05	100	0.003138	0.0001569	1	0.0114	0.015251754	0.8	0.02	0.4	0.04
Thallium	0.2	0.000182	0.0000364	0.0015	0.003	0.0000045	0.05	100	0.003138	0.0001569	1	0.0114	0.017350877	1.2	0.01	0.12	0.14
Uranium	15.3	0.000182	0.0027846	0.13	0.003	0.00039	4.381676	100	0.003138	0.0137497	1	0.0114	1.484587657	1600	0.00	160	0.01
Vanadium	49.6	0.000182	0.0090272	0.0082	0.003	0.0000246	NM	100	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	116	0.000182	0.021112	0.38	0.003	0.00114	40	100	0.003138	0.12552	1	0.0114	12.96245614	223.5	0.06	10.5	**1.23**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 15. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00328			0.0128				100	0.00762		1	0.103					
Arsenic	50.5	0.00328	0.16564	0.0093	0.0128	0.00011904	0.071	3.5855	100	0.00762	0.02732151	1	0.103	1.874568447	22.8	0.08	5.7	0.33
Cadmium	0.8	0.00328	0.002624	0.0044	0.0128	0.00005632	69.561	55.6488	100	0.00762	0.42404386	1	0.103	4.142953165	3.4	**1.22**	0.85	**4.87**
Chromium	29.1	0.00328	0.095448	0.0169	0.0128	0.00021632	0.8	23.28	100	0.00762	0.1773936	1	0.103	2.651047767	5	0.53	1	**2.65**
Cobalt	15.7	0.00328	0.051496	0.0024	0.0128	0.00003072	0.18	2.826	100	0.00762	0.02153412	1	0.103	0.709328544	43.9	0.02	23.1	0.03
Copper	32.2	0.00328	0.105616	0.051	0.0128	0.0006528	1.398	45.0156	100	0.00762	0.34301887	1	0.103	4.362016233	33.2	0.13	26.9	0.16
Lead	27.1	0.00328	0.088888	0.0059	0.0128	0.00007552	2.659	72.0589	100	0.00762	0.54908882	1	0.103	6.194682893	15	0.41	1.5	**4.13**
Manganese	1990	0.00328	6.5272	15.9	0.0128	0.20352	0.079	157.21	100	0.00762	1.1979402	1	0.103	76.9772835	9770	0.01	977	0.08
Molybdenum	1.6	0.00328	0.005248	NM	0.0128	N/A	1	1.6	100	0.00762	0.012192	1	0.103	0.169320388	35.5	0.00	3.55	0.05
Nickel	21.7	0.00328	0.071176	0.32	0.0128	0.004096	1.143	24.8031	100	0.00762	0.18899962	1	0.103	2.565743903	79	0.03	57.2	0.04
Selenium	0.085	0.00328	0.0002788	0.0005	0.0128	0.0000064	1.754	0.14909	100	0.00762	0.00113607	1	0.103	0.013798697	0.8	0.02	0.4	0.03
Thallium	0.2	0.00328	0.000656	0.0015	0.0128	0.0000192	0.123	0.0246	100	0.00762	0.00018745	1	0.103	0.008375262	1.2	0.01	0.12	0.07
Uranium	15.3	0.00328	0.050184	0.13	0.0128	0.001664	1	15.3	100	0.00762	0.116586	1	0.103	1.635281553	1600	0.00	160	0.01
Vanadium	49.6	0.00328	0.162688	0.0082	0.0128	0.00010496	0.019	0.9424	100	0.00762	0.00718109	1	0.103	1.650233476	114	0.01	11.4	0.14
Zinc	116	0.00328	0.38048	0.38	0.0128	0.004864	16.364	1898.224	100	0.00762	14.4644669	1	0.103	144.1729212	223.5	0.65	10.5	**13.73**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 15. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.02023			0.046				100	0.04697		1	0.68					
Arsenic	50.5	0.02023	1.021615	0.0093	0.046	0.0004278	0.071	3.5855	100	0.04697	0.16841094	1	0.68	1.750667257	22.8	0.08	5.7	0.31
Cadmium	0.8	0.02023	0.016184	0.0044	0.046	0.0002024	69.561	55.6488	100	0.04697	2.61382414	1	0.68	3.867956671	3.4	**1.14**	0.85	**4.55**
Chromium	29.1	0.02023	0.588693	0.0169	0.046	0.0007774	0.8	23.28	100	0.04697	1.0934616	1	0.68	2.4749	5	0.49	1	**2.47**
Cobalt	15.7	0.02023	0.317611	0.0024	0.046	0.0001104	0.18	2.826	100	0.04697	0.13273722	1	0.68	0.662439147	43.9	0.02	23.1	0.03
Copper	32.2	0.02023	0.651406	0.051	0.046	0.002346	1.398	45.0156	100	0.04697	2.11438273	1	0.68	4.070786371	33.2	0.12	26.9	0.15
Lead	27.1	0.02023	0.548233	0.0059	0.046	0.0002714	2.659	72.0589	100	0.04697	3.38460653	1	0.68	5.783986666	15	0.39	1.5	**3.86**
Manganese	1990	0.02023	40.2577	15.9	0.046	0.7314	0.079	157.21	100	0.04697	7.3841537	1	0.68	71.13713779	9770	0.01	977	0.07
Molybdenum	1.6	0.02023	0.032368	NM	0.046	N/A	1	1.6	100	0.04697	0.075152	1	0.68	0.158117647	35.5	0.00	3.55	0.04
Nickel	21.7	0.02023	0.438991	0.32	0.046	0.01472	1.143	24.8031	100	0.04697	1.16500161	1	0.68	2.380459716	79	0.03	57.2	0.04
Selenium	0.085	0.02023	0.00171955	0.0005	0.046	0.000023	1.754	0.14909	100	0.04697	0.00700276	1	0.68	0.012860746	0.8	0.02	0.4	0.03
Thallium	0.2	0.02023	0.004046	0.0015	0.046	0.000069	0.123	0.0246	100	0.04697	0.00115546	1	0.68	0.007750679	1.2	0.01	0.12	0.06
Uranium	15.3	0.02023	0.309519	0.13	0.046	0.00598	1	15.3	100	0.04697	0.718641	1	0.68	1.520794118	1600	0.00	160	0.01
Vanadium	49.6	0.02023	1.003408	0.0082	0.046	0.0003772	0.019	0.9424	100	0.04697	0.04426453	1	0.68	1.5412496	114	0.01	11.4	0.14
Zinc	116	0.02023	2.34668	0.38	0.046	0.01748	16.364	1898.224	100	0.04697	89.1595813	1	0.68	134.5937372	223.5	0.60	10.5	**12.82**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 15. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035			100	0.01841		1	0.45					
Arsenic	50.5	0.00189	0.095445	0.0093	0.035	0.0003255	4	100	0.01841	0.07364	1	0.45	0.376467778	22.8	0.02	5.7	0.07
Cadmium	0.8	0.00189	0.001512	0.0044	0.035	0.000154	2.1	100	0.01841	0.038661	1	0.45	0.089615556	3.4	0.03	0.85	0.11
Chromium	29.1	0.00189	0.054999	0.0169	0.035	0.0005915	0.7	100	0.01841	0.012887	1	0.45	0.152172222	5	0.03	1	0.15
Cobalt	15.7	0.00189	0.029673	0.0024	0.035	0.000084	0.3	100	0.01841	0.005523	1	0.45	0.0784	43.9	0.00	23.1	0.00
Copper	32.2	0.00189	0.060858	0.051	0.035	0.001785	5	100	0.01841	0.09205	1	0.45	0.343762222	33.2	0.01	26.9	0.01
Lead	27.1	0.00189	0.051219	0.0059	0.035	0.0002065	0.5	100	0.01841	0.009205	1	0.45	0.134734444	15	0.01	1.5	0.09
Manganese	1990	0.00189	3.7611	15.9	0.035	0.5565	610	100	0.01841	11.2301	1	0.45	34.55044444	9770	0.00	977	0.04
Molybdenum	1.6	0.00189	0.003024	NM	0.035	N/A	NM	100	0.01841	N/A	1	0.45	N/A	35.5	N/A	3.55	N/A
Nickel	21.7	0.00189	0.041013	0.32	0.035	0.0112	5	100	0.01841	0.09205	1	0.45	0.320584444	79	0.00	57.2	0.01
Selenium	0.085	0.00189	0.00016065	0.0005	0.035	0.0000175	0.05	100	0.01841	0.0009205	1	0.45	0.002441444	0.8	0.00	0.4	0.01
Thallium	0.2	0.00189	0.000378	0.0015	0.035	0.0000525	0.05	100	0.01841	0.0009205	1	0.45	0.003002222	1.2	0.00	0.12	0.03
Uranium	15.3	0.00189	0.028917	0.13	0.035	0.00455	4.381676	100	0.01841	0.0806667	1	0.45	0.253630345	1600	0.00	160	0.00
Vanadium	49.6	0.00189	0.093744	0.0082	0.035	0.000287	NM	100	0.01841	N/A	1	0.45	N/A	114	N/A	11.4	N/A
Zinc	116	0.00189	0.21924	0.38	0.035	0.0133	40	100	0.01841	0.7364	1	0.45	2.1532	223.5	0.01	10.5	0.21

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 15. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0085				100	0.006236		1	0.055					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000724	0.036562	0.0093	0.0085	0.00007905	0.925	46.7125	100	0.006236	0.2912992	1	0.055	5.962549091	22.8	0.26	5.7	**1.05**
Cadmium	0.8	0.000724	0.0005792	0.0044	0.0085	0.0000374	190	152	100	0.006236	0.947872	1	0.055	17.24524727	3.4	**5.07**	0.85	**20.29**
Chromium	29.1	0.000724	0.0210684	0.0169	0.0085	0.00014365	11.416	332.2056	100	0.006236	2.0716341	1	0.055	38.05174857	5	**7.61**	1	**38.05**
Cobalt	15.7	0.000724	0.0113668	0.0024	0.0085	0.0000204	0.321	5.0397	100	0.006236	0.0314276	1	0.055	0.778450349	43.9	0.02	23.1	0.03
Copper	32.2	0.000724	0.0233128	0.051	0.0085	0.0004335	5.492	176.8424	100	0.006236	1.1027892	1	0.055	20.48246375	33.2	0.62	26.9	0.76
Lead	27.1	0.000724	0.0196204	0.0059	0.0085	0.00005015	228.261	6185.8731	100	0.006236	38.575105	1	0.055	701.7231855	15	**46.78**	1.5	**467.82**
Manganese	1990	0.000724	1.44076	15.9	0.0085	0.13515	0.228	453.72	100	0.006236	2.8293979	1	0.055	80.09650764	9770	0.01	977	0.08
Molybdenum	1.6	0.000724	0.0011584	NM	0.0085	N/A	2.091	3.3456	100	0.006236	0.0208632	1	0.055	0.400392029	35.5	0.01	3.55	0.11
Nickel	21.7	0.000724	0.0157108	0.32	0.0085	0.00272	7.802	169.3034	100	0.006236	1.055776	1	0.055	19.53103277	79	0.25	57.2	0.34
Selenium	0.085	0.000724	0.00006154	0.0005	0.0085	0.00000425	13.733	1.167305	100	0.006236	0.0072793	1	0.055	0.133547345	0.8	0.17	0.4	0.33
Thallium	0.2	0.000724	0.0001448	0.0015	0.0085	0.00001275	1	0.2	100	0.006236	0.0012472	1	0.055	0.025540909	1.2	0.02	0.12	0.21
Uranium	15.3	0.000724	0.0110772	0.13	0.0085	0.001105	0.063	0.9639	100	0.006236	0.0060109	1	0.055	0.33078328	1600	0.00	160	0.00
Vanadium	49.6	0.000724	0.0359104	0.0082	0.0085	0.0000697	0.088	4.3648	100	0.006236	0.0272189	1	0.055	1.149072596	114	0.01	11.4	0.10
Zinc	116	0.000724	0.083984	0.38	0.0085	0.00323	49.51	5743.16	100	0.006236	35.814346	1	0.055	652.755632	223.5	**2.92**	10.5	**62.17**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 15. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	50.5	0.000142	0.007171	0.0093	0.0061	0.00005673	19	100	0.005778	0.109782	1	0.02	5.8504865	9.63	0.61	1.91	**3.06**
Cadmium	0.8	0.000142	0.0001136	0.0044	0.0061	0.00002684	4	100	0.005778	0.023112	1	0.02	1.162622	2.3	0.51	0.23	**5.05**
Chromium	29.1	0.000142	0.0041322	0.0169	0.0061	0.00010309	16	100	0.005778	0.092448	1	0.02	4.8341645	56.8	0.09	5.68	0.85
Cobalt	15.7	0.000142	0.0022294	0.0024	0.0061	0.00001464	15	100	0.005778	0.08667	1	0.02	4.445702	20	0.22	5	0.89
Copper	32.2	0.000142	0.0045724	0.051	0.0061	0.0003111	116	100	0.005778	0.670248	1	0.02	33.756575	35.4	0.95	24.3	**1.39**
Lead	27.1	0.000142	0.0038482	0.0059	0.0061	0.00003599	37.9	100	0.005778	0.2189862	1	0.02	11.1435195	80	0.14	8	**1.39**
Manganese	1990	0.000142	0.28258	15.9	0.0061	0.09699	1420	100	0.005778	8.20476	1	0.02	429.2165	268	**1.60**	83	**5.17**
Molybdenum	1.6	0.000142	0.0002272	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	21.7	0.000142	0.0030814	0.32	0.0061	0.001952	26	100	0.005778	0.150228	1	0.02	7.76307	42.1	0.18	23.1	0.34
Selenium	0.085	0.000142	0.00001207	0.0005	0.0061	0.00000305	0.5	100	0.005778	0.002889	1	0.02	0.145206	0.25	0.58	0.025	**5.81**
Thallium	0.2	0.000142	0.0000284	0.0015	0.0061	0.00000915	0.4	100	0.005778	0.0023112	1	0.02	0.1174375	0.74	0.16	0.074	**1.59**
Uranium	15.3	0.000142	0.0021726	0.13	0.0061	0.000793	876.09	100	0.005778	5.0620423	1	0.02	253.250395	5	**50.65**	0.5	**506.50**
Vanadium	49.6	0.000142	0.0070432	0.0082	0.0061	0.00005002	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	116	0.000142	0.016472	0.38	0.0061	0.002318	147	100	0.005778	0.849366	1	0.02	43.4078	225	0.19	22.5	**1.93**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 21. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	50.5	0.000142	0.007171	0.0093	0.0061	0.00005673	4	100	0.005778	0.023112	1	0.02	1.5169865	9.63	0.16	1.91	0.79
Cadmium	0.8	0.000142	0.0001136	0.0044	0.0061	0.00002684	2.1	100	0.005778	0.0121338	1	0.02	0.613712	2.3	0.27	0.23	**2.67**
Chromium	29.1	0.000142	0.0041322	0.0169	0.0061	0.00010309	0.7	100	0.005778	0.0040446	1	0.02	0.4139945	56.8	0.01	5.68	0.07
Cobalt	15.7	0.000142	0.0022294	0.0024	0.0061	0.00001464	0.3	100	0.005778	0.0017334	1	0.02	0.198872	20	0.01	5	0.04
Copper	32.2	0.000142	0.0045724	0.051	0.0061	0.0003111	5	100	0.005778	0.02889	1	0.02	1.688675	35.4	0.05	24.3	0.07
Lead	27.1	0.000142	0.0038482	0.0059	0.0061	0.00003599	0.5	100	0.005778	0.002889	1	0.02	0.3386595	80	0.00	8	0.04
Manganese	1990	0.000142	0.28258	15.9	0.0061	0.09699	610	100	0.005778	3.52458	1	0.02	195.2075	268	0.73	83	**2.35**
Molybdenum	1.6	0.000142	0.0002272	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	21.7	0.000142	0.0030814	0.32	0.0061	0.001952	5	100	0.005778	0.02889	1	0.02	1.69617	42.1	0.04	23.1	0.07
Selenium	0.085	0.000142	0.00001207	0.0005	0.0061	0.00000305	0.05	100	0.005778	0.0002889	1	0.02	0.015201	0.25	0.06	0.025	0.61
Thallium	0.2	0.000142	0.0000284	0.0015	0.0061	0.00000915	0.05	100	0.005778	0.0002889	1	0.02	0.0163225	0.74	0.02	0.074	0.22
Uranium	15.3	0.000142	0.0021726	0.13	0.0061	0.000793	4.38	100	0.005778	0.0253173	1	0.02	1.414146196	5	0.28	0.5	**2.83**
Vanadium	49.6	0.000142	0.0070432	0.0082	0.0061	0.00005002	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	116	0.000142	0.016472	0.38	0.0061	0.002318	40	100	0.005778	0.23112	1	0.02	12.4955	225	0.06	22.5	0.56

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 15. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.666			13.5			100	1.554		1	22					
Arsenic	50.5	0.666	33.633	0.0093	13.5	0.12555	4	100	1.554	6.216	1	22	1.817025	9.63	0.19	1.91	0.95
Cadmium	0.8	0.666	0.5328	0.0044	13.5	0.0594	2.1	100	1.554	3.2634	1	22	0.175254545	2.3	0.08	0.23	0.76
Chromium	29.1	0.666	19.3806	0.0169	13.5	0.22815	0.7	100	1.554	1.0878	1	22	0.940752273	56.8	0.02	5.68	0.17
Cobalt	15.7	0.666	10.4562	0.0024	13.5	0.0324	0.3	100	1.554	0.4662	1	22	0.497945455	20	0.02	5	0.10
Copper	32.2	0.666	21.4452	0.051	13.5	0.6885	5	100	1.554	7.77	1	22	1.359259091	35.4	0.04	24.3	0.06
Lead	27.1	0.666	18.0486	0.0059	13.5	0.07965	0.5	100	1.554	0.777	1	22	0.859329545	80	0.01	8	0.11
Manganese	1990	0.666	1325.34	15.9	13.5	214.65	610	100	1.554	947.94	1	22	113.0877273	268	0.42	83	**1.36**
Molybdenum	1.6	0.666	1.0656	NM	13.5	N/A	NM	100	1.554	N/A	1	22	N/A	1.9	N/A	0.19	N/A
Nickel	21.7	0.666	14.4522	0.32	13.5	4.32	5	100	1.554	7.77	1	22	1.206463636	42.1	0.03	23.1	0.05
Selenium	0.085	0.666	0.05661	0.0005	13.5	0.00675	0.05	100	1.554	0.0777	1	22	0.006411818	0.25	0.03	0.025	0.26
Thallium	0.2	0.666	0.1332	0.0015	13.5	0.02025	0.05	100	1.554	0.0777	1	22	0.010506818	0.74	0.01	0.074	0.14
Uranium	15.3	0.666	10.1898	0.13	13.5	1.755	4.381676	100	1.554	6.8091245	1	22	0.852451114	5	0.17	0.5	**1.70**
Vanadium	49.6	0.666	33.0336	0.0082	13.5	0.1107	NM	100	1.554	N/A	1	22	N/A	2.1	N/A	0.21	N/A
Zinc	116	0.666	77.256	0.38	13.5	5.13	40	100	1.554	62.16	1	22	6.570272727	225	0.03	22.5	0.29

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 15. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0122			0.57				100	0.4218		1	7					
Arsenic	50.5	0.0122	0.6161	0.0093	0.57	0.005301	0.071	3.5855	100	0.4218	1.5123639	1	7	0.304823557	9.63	0.03	1.91	0.16
Cadmium	0.8	0.0122	0.00976	0.0044	0.57	0.002508	69.561	55.6488	100	0.4218	23.4726638	1	7	3.354990263	2.3	**1.46**	0.23	**14.59**
Chromium	29.1	0.0122	0.35502	0.0169	0.57	0.009633	0.8	23.28	100	0.4218	9.819504	1	7	1.454879571	56.8	0.03	5.68	0.26
Cobalt	15.7	0.0122	0.19154	0.0024	0.57	0.001368	0.18	2.826	100	0.4218	1.1920068	1	7	0.197844971	20	0.01	5	0.04
Copper	32.2	0.0122	0.39284	0.051	0.57	0.02907	1.398	45.0156	100	0.4218	18.9875801	1	7	2.772784297	35.4	0.08	24.3	0.11
Lead	27.1	0.0122	0.33062	0.0059	0.57	0.003363	2.659	72.0589	100	0.4218	30.394444	1	7	4.389775289	80	0.05	8	0.55
Manganese	1990	0.0122	24.278	15.9	0.57	9.063	0.079	157.21	100	0.4218	66.311178	1	7	14.23602543	268	0.05	83	0.17
Molybdenum	1.6	0.0122	0.01952	NM	0.57	N/A	1	1.6	100	0.4218	0.67488	1	7	0.0992	1.9	0.05	0.19	0.52
Nickel	21.7	0.0122	0.26474	0.32	0.57	0.1824	1.143	24.8031	100	0.4218	10.4619476	1	7	1.558441083	42.1	0.04	23.1	0.07
Selenium	0.085	0.0122	0.001037	0.0005	0.57	0.000285	1.754	0.14909	100	0.4218	0.06288616	1	7	0.009172595	0.25	0.04	0.025	0.37
Thallium	0.2	0.0122	0.00244	0.0015	0.57	0.000855	0.123	0.0246	100	0.4218	0.01037628	1	7	0.00195304	0.74	0.00	0.074	0.03
Uranium	15.3	0.0122	0.18666	0.13	0.57	0.0741	1	15.3	100	0.4218	6.45354	1	7	0.959185714	5	0.19	0.5	**1.92**
Vanadium	49.6	0.0122	0.60512	0.0082	0.57	0.004674	0.019	0.9424	100	0.4218	0.39750432	1	7	0.14389976	2.1	0.07	0.21	0.69
Zinc	116	0.0122	1.4152	0.38	0.57	0.2166	16.364	1898.224	100	0.4218	800.670883	1	7	114.614669	225	0.51	22.5	**5.09**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 15. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329				100	0.30132		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.00868	0.43834	0.0093	0.329	0.0030597	0.071	3.5855	100	0.30132	1.08038286	1	3.8	0.400469095	9.63	0.04	1.91	0.21
Cadmium	0.8	0.00868	0.006944	0.0044	0.329	0.0014476	69.561	55.6488	100	0.30132	16.7680964	1	3.8	4.414865267	2.3	**1.92**	0.23	**19.20**
Chromium	29.1	0.00868	0.252588	0.0169	0.329	0.0055601	0.8	23.28	100	0.30132	7.0147296	1	3.8	1.913915184	56.8	0.03	5.68	0.34
Cobalt	15.7	0.00868	0.136276	0.0024	0.329	0.0007896	0.18	2.826	100	0.30132	0.85153032	1	3.8	0.260156821	20	0.01	5	0.05
Copper	32.2	0.00868	0.279496	0.051	0.329	0.016779	1.398	45.0156	100	0.30132	13.5641006	1	3.8	3.647467261	35.4	0.10	24.3	0.15
Lead	27.1	0.00868	0.235228	0.0059	0.329	0.0019411	2.659	72.0589	100	0.30132	21.7127877	1	3.8	5.776304434	80	0.07	8	0.72
Manganese	1990	0.00868	17.2732	15.9	0.329	5.2311	0.079	157.21	100	0.30132	47.3705172	1	3.8	18.38810979	268	0.07	83	0.22
Molybdenum	1.6	0.00868	0.013888	NM	0.329	N/A	1	1.6	100	0.30132	0.482112	1	3.8	0.130526316	1.9	0.07	0.19	0.69
Nickel	21.7	0.00868	0.188356	0.32	0.329	0.10528	1.143	24.8031	100	0.30132	7.47367009	1	3.8	2.044027919	42.1	0.05	23.1	0.09
Selenium	0.085	0.00868	0.0007378	0.0005	0.329	0.0001645	1.754	0.14909	100	0.30132	0.0449238	1	3.8	0.0120595	0.25	0.05	0.025	0.48
Thallium	0.2	0.00868	0.001736	0.0015	0.329	0.0004935	0.123	0.0246	100	0.30132	0.00741247	1	3.8	0.002537361	0.74	0.00	0.074	0.03
Uranium	15.3	0.00868	0.132804	0.13	0.329	0.04277	1	15.3	100	0.30132	4.610196	1	3.8	1.259413158	5	0.25	0.5	**2.52**
Vanadium	49.6	0.00868	0.430528	0.0082	0.329	0.0026978	0.019	0.9424	100	0.30132	0.28396397	1	3.8	0.188734149	2.1	0.09	0.21	0.90
Zinc	116	0.00868	1.00688	0.38	0.329	0.12502	16.364	1898.224	100	0.30132	571.972856	1	3.8	150.817041	225	0.67	22.5	**6.70**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 15. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000234			0.00157				100	0.004266		1	0.002					
Arsenic	50.5	0.000234	0.011817	0.0093	0.00157	0.000014601	0.925	46.7125	100	0.004266	0.1992755	1	0.002	105.553563	9.63	**10.96**	1.91	**55.26**
Cadmium	0.8	0.000234	0.0001872	0.0044	0.00157	0.000006908	190	152	100	0.004266	0.648432	1	0.002	324.313054	2.3	**141.01**	0.23	**1410.06**
Chromium	29.1	0.000234	0.0068094	0.0169	0.00157	0.000026533	11.416	332.2056	100	0.004266	1.4171891	1	0.002	712.0125113	56.8	**12.54**	5.68	**125.35**
Cobalt	15.7	0.000234	0.0036738	0.0024	0.00157	0.000003768	0.321	5.0397	100	0.004266	0.0214994	1	0.002	12.5884641	20	0.63	5	**2.52**
Copper	32.2	0.000234	0.0075348	0.051	0.00157	0.00008007	5.492	176.8424	100	0.004266	0.7544097	1	0.002	381.0122742	35.4	**10.76**	24.3	**15.68**
Lead	27.1	0.000234	0.0063414	0.0059	0.00157	0.000009263	228.261	6185.8731	100	0.004266	26.388935	1	0.002	13197.64265	80	**164.97**	8	**1649.71**
Manganese	1990	0.000234	0.46566	15.9	0.00157	0.024963	0.228	453.72	100	0.004266	1.9355695	1	0.002	1213.09626	268	**4.53**	83	**14.62**
Molybdenum	1.6	0.000234	0.0003744	NM	0.00157	N/A	2.091	3.3456	100	0.004266	0.0142723	1	0.002	7.3233648	1.9	**3.85**	0.19	**38.54**
Nickel	21.7	0.000234	0.0050778	0.32	0.00157	0.0005024	7.802	169.3034	100	0.004266	0.7222483	1	0.002	363.9142522	42.1	**8.64**	23.1	**15.75**
Selenium	0.085	0.000234	0.00001989	0.0005	0.00157	0.000000785	13.733	1.167305	100	0.004266	0.0049797	1	0.002	2.500199065	0.25	**10.00**	0.025	**100.01**
Thallium	0.2	0.000234	0.0000468	0.0015	0.00157	0.000002355	1	0.2	100	0.004266	0.0008532	1	0.002	0.4511775	0.74	0.61	0.074	**6.10**
Uranium	15.3	0.000234	0.0035802	0.13	0.00157	0.0002041	0.063	0.9639	100	0.004266	0.004112	1	0.002	3.9481487	5	0.79	0.5	**7.90**
Vanadium	49.6	0.000234	0.0116064	0.0082	0.00157	0.000012874	0.088	4.3648	100	0.004266	0.0186202	1	0.002	15.1197554	2.1	**7.20**	0.21	**72.00**
Zinc	116	0.000234	0.027144	0.38	0.00157	0.0005966	49.51	5743.16	100	0.004266	24.500321	1	0.002	12264.03058	225	**54.51**	22.5	**545.07**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 15. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378			58		42	0.005053		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	50.5	0.000977	0.0493385	0.0093	0.00378	0.000035154	4	58	2.1	42	0.005053	0.01617971	1	0.009	7.283706667	9.63	0.76	1.91	**3.81**
Cadmium	0.8	0.000977	0.0007816	0.0044	0.00378	0.000016632	2.1	58	1.3	42	0.005053	0.00891349	1	0.009	1.079080444	2.3	0.47	0.23	**4.69**
Chromium	29.1	0.000977	0.0284307	0.0169	0.00378	0.000063882	0.7	58	2.2	42	0.005053	0.00672049	1	0.009	3.912785778	56.8	0.07	5.68	0.69
Cobalt	15.7	0.000977	0.0153389	0.0024	0.00378	0.000009072	0.3	58	1.26	42	0.005053	0.00355327	1	0.009	2.100137956	20	0.11	5	0.42
Copper	32.2	0.000977	0.0314594	0.051	0.00378	0.00019278	5	58	69.1	42	0.005053	0.16130187	1	0.009	21.43933844	35.4	0.61	24.3	0.88
Lead	27.1	0.000977	0.0264767	0.0059	0.00378	0.000022302	0.5	58	3.5	42	0.005053	0.00889328	1	0.009	3.932475778	80	0.05	8	0.49
Manganese	1990	0.000977	1.94423	15.9	0.00378	0.060102	610	58	108	42	0.005053	2.01695548	1	0.009	446.80972	268	**1.67**	83	**5.38**
Molybdenum	1.6	0.000977	0.0015632	NM	0.00378	N/A	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	1.9	N/A	0.19	N/A
Nickel	21.7	0.000977	0.0212009	0.32	0.00378	0.0012096	5	58	2	42	0.005053	0.01889822	1	0.009	4.589857778	42.1	0.11	23.1	0.20
Selenium	0.085	0.000977	0.000083045	0.0005	0.00378	0.00000189	0.05	58	0.3	42	0.005053	0.00078322	1	0.009	0.096461111	0.25	0.39	0.025	**3.86**
Thallium	0.2	0.000977	0.0001954	0.0015	0.00378	0.00000567	0.05	58	0.1	42	0.005053	0.00035876	1	0.009	0.062203667	0.74	0.08	0.074	0.84
Uranium	15.3	0.000977	0.0149481	0.13	0.00378	0.0004914	4.381676	58	7.52	42	0.005053	0.02880095	1	0.009	4.915605369	5	0.98	0.5	**9.83**
Vanadium	49.6	0.000977	0.0484592	0.0082	0.00378	0.000030996	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	2.1	N/A	0.21	N/A
Zinc	116	0.000977	0.113332	0.38	0.00378	0.0014364	40	58	152	42	0.005053	0.43981312	1	0.009	61.62016889	225	0.27	22.5	**2.74**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 16. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000538			0.00392			100	0.0122462		1	0.0175					
Arsenic	5.5	0.0000538	0.0002959	0.0007	0.00392	0.000002744	2.1	100	0.0122462	0.02571702	1	0.0175	1.486609371	22.8	0.07	5.7	0.26
Cadmium	0.36	0.0000538	0.000019368	0.053	0.00392	0.00020776	1.3	100	0.0122462	0.01592006	1	0.0175	0.922696457	3.4	0.27	0.85	**1.09**
Chromium	13.9	0.0000538	0.00074782	0.0081	0.00392	0.000031752	2.2	100	0.0122462	0.02694164	1	0.0175	1.584069257	5	0.32	1	**1.58**
Cobalt	8.3	0.0000538	0.00044654	0.06	0.00392	0.0002352	1.26	100	0.0122462	0.015430212	1	0.0175	0.920682971	43.9	0.02	23.1	0.04
Copper	15.4	0.0000538	0.00082852	0.08	0.00392	0.0003136	69.1	100	0.0122462	0.84621242	1	0.0175	48.42025943	33.2	**1.46**	26.9	**1.80**
Lead	16.1	0.0000538	0.00086618	0.0001	0.00392	0.000000392	3.5	100	0.0122462	0.0428617	1	0.0175	2.4987584	15	0.17	1.5	**1.67**
Manganese	623	0.0000538	0.0335174	91.2	0.00392	0.357504	108	100	0.0122462	1.3225896	1	0.0175	97.92062857	9770	0.01	977	0.10
Molybdenum	1.8	0.0000538	0.00009684	NM	0.00392	N/A	NM	100	0.0122462	N/A	1	0.0175	N/A	35.5	N/A	3.55	N/A
Nickel	12.3	0.0000538	0.00066174	1.38	0.00392	0.0054096	2	100	0.0122462	0.0244924	1	0.0175	1.746499429	79	0.02	57.2	0.03
Selenium	0.76	0.0000538	0.000040888	0.0005	0.00392	0.00000196	0.3	100	0.0122462	0.00367386	1	0.0175	0.212383314	0.8	0.27	0.4	0.53
Thallium	0.17	0.0000538	0.000009146	0.00005	0.00392	0.000000196	0.1	100	0.0122462	0.00122462	1	0.0175	0.070512114	1.2	0.06	0.12	0.59
Uranium	15.5	0.0000538	0.0008339	0.727	0.00392	0.00284984	7.52	100	0.0122462	0.092091424	1	0.0175	5.472866514	1600	0.00	160	0.03
Vanadium	27.9	0.0000538	0.00150102	0.00051	0.00392	1.9992E-06	NM	100	0.0122462	N/A	1	0.0175	N/A	114	N/A	11.4	N/A
Zinc	58.1	0.0000538	0.00312578	3	0.00392	0.01176	152	100	0.0122462	1.8614224	1	0.0175	107.2176103	223.5	0.48	10.5	**10.21**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 16. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000182			0.003			60		40	0.003138		1	0.0114					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000182	0.001001	0.0007	0.003	0.0000021	4	60	2.1	40	0.003138	0.01016712	1	0.0114	0.97984386	22.8	0.04	5.7	0.17
Cadmium	0.36	0.000182	0.00006552	0.053	0.003	0.000159	2.1	60	1.3	40	0.003138	0.00558564	1	0.0114	0.509663158	3.4	0.15	0.85	0.60
Chromium	13.9	0.000182	0.0025298	0.0081	0.003	0.0000243	0.7	60	2.2	40	0.003138	0.0040794	1	0.0114	0.581885965	5	0.12	1	0.58
Cobalt	8.3	0.000182	0.0015106	0.06	0.003	0.00018	0.3	60	1.26	40	0.003138	0.002146392	1	0.0114	0.336578246	43.9	0.01	23.1	0.01
Copper	15.4	0.000182	0.0028028	0.08	0.003	0.00024	5	60	69.1	40	0.003138	0.09614832	1	0.0114	8.700975439	33.2	0.26	26.9	0.32
Lead	16.1	0.000182	0.0029302	0.0001	0.003	0.0000003	0.5	60	3.5	40	0.003138	0.0053346	1	0.0114	0.725008772	15	0.05	1.5	0.48
Manganese	623	0.000182	0.113386	91.2	0.003	0.2736	610	60	108	40	0.003138	1.2840696	1	0.0114	146.5838246	9770	0.02	977	0.15
Molybdenum	1.8	0.000182	0.0003276	NM	0.003	N/A	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	12.3	0.000182	0.0022386	1.38	0.003	0.00414	5	60	2	40	0.003138	0.0119244	1	0.0114	1.605526316	79	0.02	57.2	0.03
Selenium	0.76	0.000182	0.00013832	0.0005	0.003	0.0000015	0.05	60	0.3	40	0.003138	0.0004707	1	0.0114	0.053554386	0.8	0.07	0.4	0.13
Thallium	0.17	0.000182	0.00003094	0.00005	0.003	0.00000015	0.05	60	0.1	40	0.003138	0.00021966	1	0.0114	0.021995614	1.2	0.02	0.12	0.18
Uranium	15.5	0.000182	0.002821	0.727	0.003	0.002181	4.381676	60	7.52	40	0.003138	0.017688924	1	0.0114	1.990431892	1,600	0.00	160	0.01
Vanadium	27.9	0.000182	0.0050778	0.00051	0.003	0.00000153	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	58.1	0.000182	0.0105742	3	0.003	0.009	40	60	152	40	0.003138	0.2661024	1	0.0114	25.05935088	223.5	0.11	10.5	**2.39**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 16. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000182			0.003			100	0.003138		1	0.0114					
Arsenic	5.5	0.000182	0.001001	0.0007	0.003	0.0000021	4	100	0.003138	0.012552	1	0.0114	1.18904386	22.8	0.05	5.7	0.21
Cadmium	0.36	0.000182	0.00006552	0.053	0.003	0.000159	2.1	100	0.003138	0.0065898	1	0.0114	0.597747368	3.4	0.18	0.85	0.70
Chromium	13.9	0.000182	0.0025298	0.0081	0.003	0.0000243	0.7	100	0.003138	0.0021966	1	0.0114	0.41672807	5	0.08	1	0.42
Cobalt	8.3	0.000182	0.0015106	0.06	0.003	0.00018	0.3	100	0.003138	0.0009414	1	0.0114	0.230877193	43.9	0.01	23.1	0.01
Copper	15.4	0.000182	0.0028028	0.08	0.003	0.00024	5	100	0.003138	0.01569	1	0.0114	1.64322807	33.2	0.05	26.9	0.06
Lead	16.1	0.000182	0.0029302	0.0001	0.003	0.0000003	0.5	100	0.003138	0.001569	1	0.0114	0.394692982	15	0.03	1.5	0.26
Manganese	623	0.000182	0.113386	91.2	0.003	0.2736	610	100	0.003138	1.91418	1	0.0114	201.8566667	9770	0.02	977	0.21
Molybdenum	1.8	0.000182	0.0003276	NM	0.003	N/A	NM	100	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	12.3	0.000182	0.0022386	1.38	0.003	0.00414	5	100	0.003138	0.01569	1	0.0114	1.935842105	79	0.02	57.2	0.03
Selenium	0.76	0.000182	0.00013832	0.0005	0.003	0.0000015	0.05	100	0.003138	0.0001569	1	0.0114	0.02602807	0.8	0.03	0.4	0.07
Thallium	0.17	0.000182	0.00003094	0.00005	0.003	0.00000015	0.05	100	0.003138	0.0001569	1	0.0114	0.016490351	1.2	0.01	0.12	0.14
Uranium	15.5	0.000182	0.002821	0.727	0.003	0.002181	4.381676	100	0.003138	0.0137497	1	0.0114	1.644885902	1600	0.00	160	0.01
Vanadium	27.9	0.000182	0.0050778	0.00051	0.003	0.00000153	NM	100	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	58.1	0.000182	0.0105742	3	0.003	0.009	40	100	0.003138	0.12552	1	0.0114	12.7275614	223.5	0.06	10.5	**1.21**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 16. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00328			0.0128				100	0.00762		1	0.103					
Arsenic	5.5	0.00328	0.01804	0.0007	0.0128	0.00000896	0.071	0.3905	100	0.00762	0.00297561	1	0.103	0.204122039	22.8	0.01	5.7	0.04
Cadmium	0.36	0.00328	0.0011808	0.053	0.0128	0.0006784	69.561	25.04196	100	0.00762	0.19081974	1	0.103	1.870669274	3.4	0.55	0.85	**2.20**
Chromium	13.9	0.00328	0.045592	0.0081	0.0128	0.00010368	0.8	11.12	100	0.00762	0.0847344	1	0.103	1.266311456	5	0.25	1	**1.27**
Cobalt	8.3	0.00328	0.027224	0.06	0.0128	0.000768	0.18	1.494	100	0.00762	0.01138428	1	0.103	0.382293981	43.9	0.01	23.1	0.02
Copper	15.4	0.00328	0.050512	0.08	0.0128	0.001024	1.398	21.5292	100	0.00762	0.1640525	1	0.103	2.093092272	33.2	0.06	26.9	0.08
Lead	16.1	0.00328	0.052808	0.0001	0.0128	0.00000128	2.659	42.8099	100	0.00762	0.32621144	1	0.103	3.679812796	15	0.25	1.5	**2.45**
Manganese	623	0.00328	2.04344	91.2	0.0128	1.16736	0.079	49.217	100	0.00762	0.37503354	1	0.103	34.81391786	9770	0.00	977	0.04
Molybdenum	1.8	0.00328	0.005904	NM	0.0128	N/A	1	1.8	100	0.00762	0.013716	1	0.103	0.190485437	35.5	0.01	3.55	0.05
Nickel	12.3	0.00328	0.040344	1.38	0.0128	0.017664	1.143	14.0589	100	0.00762	0.10712882	1	0.103	1.603270078	79	0.02	57.2	0.03
Selenium	0.76	0.00328	0.0024928	0.0005	0.0128	0.0000064	1.754	1.33304	100	0.00762	0.01015776	1	0.103	0.122883153	0.8	0.15	0.4	0.31
Thallium	0.17	0.00328	0.0005576	0.00005	0.0128	0.00000064	0.123	0.02091	100	0.00762	0.00015933	1	0.103	0.00696674	1.2	0.01	0.12	0.06
Uranium	15.5	0.00328	0.05084	0.727	0.0128	0.0093056	1	15.5	100	0.00762	0.11811	1	0.103	1.730636893	1600	0.00	160	0.01
Vanadium	27.9	0.00328	0.091512	0.00051	0.0128	0.000006528	0.019	0.5301	100	0.00762	0.00403936	1	0.103	0.927746505	114	0.01	11.4	0.08
Zinc	58.1	0.00328	0.190568	3	0.0128	0.0384	16.364	950.7484	100	0.00762	7.24470281	1	0.103	72.55991076	223.5	0.32	10.5	**6.91**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 16. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.02023			0.046				100	0.04697		1	0.68					
Arsenic	5.5	0.02023	0.111265	0.0007	0.046	0.0000322	0.071	0.3905	100	0.04697	0.01834179	1	0.68	0.190645566	22.8	0.01	5.7	0.03
Cadmium	0.36	0.02023	0.0072828	0.053	0.046	0.002438	69.561	25.04196	100	0.04697	1.17622086	1	0.68	1.744031855	3.4	0.51	0.85	**2.05**
Chromium	13.9	0.02023	0.281197	0.0081	0.046	0.0003726	0.8	11.12	100	0.04697	0.5223064	1	0.68	1.182170588	5	0.24	1	**1.18**
Cobalt	8.3	0.02023	0.167909	0.06	0.046	0.00276	0.18	1.494	100	0.04697	0.07017318	1	0.68	0.354179676	43.9	0.01	23.1	0.02
Copper	15.4	0.02023	0.311542	0.08	0.046	0.00368	1.398	21.5292	100	0.04697	1.01122652	1	0.68	1.950659594	33.2	0.06	26.9	0.07
Lead	16.1	0.02023	0.325703	0.0001	0.046	0.0000046	2.659	42.8099	100	0.04697	2.010781	1	0.68	3.436012651	15	0.23	1.5	**2.29**
Manganese	623	0.02023	12.60329	91.2	0.046	4.1952	0.079	49.217	100	0.04697	2.31172249	1	0.68	28.10325366	9770	0.00	977	0.03
Molybdenum	1.8	0.02023	0.036414	NM	0.046	N/A	1	1.8	100	0.04697	0.084546	1	0.68	0.177882353	35.5	0.01	3.55	0.05
Nickel	12.3	0.02023	0.248829	1.38	0.046	0.06348	1.143	14.0589	100	0.04697	0.66034653	1	0.68	1.430375784	79	0.02	57.2	0.03
Selenium	0.76	0.02023	0.0153748	0.0005	0.046	0.000023	1.754	1.33304	100	0.04697	0.06261289	1	0.68	0.114721601	0.8	0.14	0.4	0.29
Thallium	0.17	0.02023	0.0034391	0.00005	0.046	0.0000023	0.123	0.02091	100	0.04697	0.00098214	1	0.68	0.00650521	1.2	0.01	0.12	0.05
Uranium	15.5	0.02023	0.313565	0.727	0.046	0.033442	1	15.5	100	0.04697	0.728035	1	0.68	1.580944118	1600	0.00	160	0.01
Vanadium	27.9	0.02023	0.564417	0.00051	0.046	0.00002346	0.019	0.5301	100	0.04697	0.0248988	1	0.68	0.866675378	114	0.01	11.4	0.08
Zinc	58.1	0.02023	1.175363	3	0.046	0.138	16.364	950.7484	100	0.04697	44.6566523	1	0.68	67.60296375	223.5	0.30	10.5	**6.44**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 16. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035			100	0.01841		1	0.45					
Arsenic	5.5	0.00189	0.010395	0.0007	0.035	0.0000245	4	100	0.01841	0.07364	1	0.45	0.186798889	22.8	0.01	5.7	0.03
Cadmium	0.36	0.00189	0.0006804	0.053	0.035	0.001855	2.1	100	0.01841	0.038661	1	0.45	0.091547556	3.4	0.03	0.85	0.11
Chromium	13.9	0.00189	0.026271	0.0081	0.035	0.0002835	0.7	100	0.01841	0.012887	1	0.45	0.087647778	5	0.02	1	0.09
Cobalt	8.3	0.00189	0.015687	0.06	0.035	0.0021	0.3	100	0.01841	0.005523	1	0.45	0.0518	43.9	0.00	23.1	0.00
Copper	15.4	0.00189	0.029106	0.08	0.035	0.0028	5	100	0.01841	0.09205	1	0.45	0.275457778	33.2	0.01	26.9	0.01
Lead	16.1	0.00189	0.030429	0.0001	0.035	0.0000035	0.5	100	0.01841	0.009205	1	0.45	0.088083333	15	0.01	1.5	0.06
Manganese	623	0.00189	1.17747	91.2	0.035	3.192	610	100	0.01841	11.2301	1	0.45	34.66571111	9770	0.00	977	0.04
Molybdenum	1.8	0.00189	0.003402	NM	0.035	N/A	NM	100	0.01841	N/A	1	0.45	N/A	35.5	N/A	3.55	N/A
Nickel	12.3	0.00189	0.023247	1.38	0.035	0.0483	5	100	0.01841	0.09205	1	0.45	0.363548889	79	0.00	57.2	0.01
Selenium	0.76	0.00189	0.0014364	0.0005	0.035	0.0000175	0.05	100	0.01841	0.0009205	1	0.45	0.005276444	0.8	0.01	0.4	0.01
Thallium	0.17	0.00189	0.0003213	0.00005	0.035	0.00000175	0.05	100	0.01841	0.0009205	1	0.45	0.002763444	1.2	0.00	0.12	0.02
Uranium	15.5	0.00189	0.029295	0.727	0.035	0.025445	4.381676	100	0.01841	0.0806667	1	0.45	0.300903678	1600	0.00	160	0.00
Vanadium	27.9	0.00189	0.052731	0.00051	0.035	0.00001785	NM	100	0.01841	N/A	1	0.45	N/A	114	N/A	11.4	N/A
Zinc	58.1	0.00189	0.109809	3	0.035	0.105	40	100	0.01841	0.7364	1	0.45	2.113797778	223.5	0.01	10.5	0.20

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 16. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0085				100	0.006236		1	0.055					
Arsenic	5.5	0.000724	0.003982	0.0007	0.0085	0.00000595	0.925	5.0875	100	0.006236	0.0317257	1	0.055	0.649338182	22.8	0.03	5.7	0.11
Cadmium	0.36	0.000724	0.00026064	0.053	0.0085	0.0004505	190	68.4	100	0.006236	0.4265424	1	0.055	7.768246182	3.4	**2.28**	0.85	**9.14**
Chromium	13.9	0.000724	0.0100636	0.0081	0.0085	0.00006885	11.416	158.6824	100	0.006236	0.9895434	1	0.055	18.17592539	5	**3.64**	1	**18.18**
Cobalt	8.3	0.000724	0.0060092	0.06	0.0085	0.00051	0.321	2.6643	100	0.006236	0.0166146	1	0.055	0.420614087	43.9	0.01	23.1	0.02
Copper	15.4	0.000724	0.0111496	0.08	0.0085	0.00068	5.492	84.5768	100	0.006236	0.5274209	1	0.055	9.804554996	33.2	0.30	26.9	0.36
Lead	16.1	0.000724	0.0116564	0.0001	0.0085	0.00000085	228.261	3675.0021	100	0.006236	22.917313	1	0.055	416.8903699	15	**27.79**	1.5	**277.93**
Manganese	623	0.000724	0.451052	91.2	0.0085	0.7752	0.228	142.044	100	0.006236	0.8857864	1	0.055	38.40069789	9770	0.00	977	0.04
Molybdenum	1.8	0.000724	0.0013032	NM	0.0085	N/A	2.091	3.7638	100	0.006236	0.0234711	1	0.055	0.450441033	35.5	0.01	3.55	0.13
Nickel	12.3	0.000724	0.0089052	1.38	0.0085	0.01173	7.802	95.9646	100	0.006236	0.5984352	1	0.055	11.25582628	79	0.14	57.2	0.20
Selenium	0.76	0.000724	0.00055024	0.0005	0.0085	0.00000425	13.733	10.43708	100	0.006236	0.0650856	1	0.055	1.193456743	0.8	**1.49**	0.4	**2.98**
Thallium	0.17	0.000724	0.00012308	0.00005	0.0085	0.000000425	1	0.17	100	0.006236	0.0010601	1	0.055	0.021520455	1.2	0.02	0.12	0.18
Uranium	15.5	0.000724	0.011222	0.727	0.0085	0.0061795	0.063	0.9765	100	0.006236	0.0060895	1	0.055	0.427108255	1600	0.00	160	0.00
Vanadium	27.9	0.000724	0.0201996	0.00051	0.0085	0.000004335	0.088	2.4552	100	0.006236	0.0153106	1	0.055	0.645719313	114	0.01	11.4	0.06
Zinc	58.1	0.000724	0.0420644	3	0.0085	0.0255	49.51	2876.531	100	0.006236	17.938047	1	0.055	327.3747585	223.5	**1.46**	10.5	**31.18**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
inverts:	Invertebrates
NS:	No studies were available for deriving LOAEL or NOAEL
BAF:	Bioaccumulation factor
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PA 16. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	5.5	0.000142	0.000781	0.0007	0.0061	0.00000427	19	100	0.005778	0.109782	1	0.02	5.5283635	9.63	0.57	1.91	**2.89**
Cadmium	0.36	0.000142	0.00005112	0.053	0.0061	0.0003233	4	100	0.005778	0.023112	1	0.02	1.174321	2.3	0.51	0.23	**5.11**
Chromium	13.9	0.000142	0.0019738	0.0081	0.0061	0.00004941	16	100	0.005778	0.092448	1	0.02	4.7235605	56.8	0.08	5.68	0.83
Cobalt	8.3	0.000142	0.0011786	0.06	0.0061	0.000366	15	100	0.005778	0.08667	1	0.02	4.41073	20	0.22	5	0.88
Copper	15.4	0.000142	0.0021868	0.08	0.0061	0.000488	116	100	0.005778	0.670248	1	0.02	33.64614	35.4	0.95	24.3	**1.38**
Lead	16.1	0.000142	0.0022862	0.0001	0.0061	0.00000061	37.9	100	0.005778	0.2189862	1	0.02	11.0636505	80	0.14	8	**1.38**
Manganese	623	0.000142	0.088466	91.2	0.0061	0.55632	1420	100	0.005778	8.20476	1	0.02	442.4773	268	**1.65**	83	**5.33**
Molybdenum	1.8	0.000142	0.0002556	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	12.3	0.000142	0.0017466	1.38	0.0061	0.008418	26	100	0.005778	0.150228	1	0.02	8.01963	42.1	0.19	23.1	0.35
Selenium	0.76	0.000142	0.00010792	0.0005	0.0061	0.00000305	0.5	100	0.005778	0.002889	1	0.02	0.1499985	0.25	0.60	0.025	**6.00**
Thallium	0.17	0.000142	0.00002414	0.00005	0.0061	0.000000305	0.4	100	0.005778	0.0023112	1	0.02	0.11678225	0.74	0.16	0.074	**1.58**
Uranium	15.5	0.000142	0.002201	0.727	0.0061	0.0044347	876.08901	100	0.005778	5.0620423	1	0.02	253.4339	5	**50.69**	0.5	**506.87**
Vanadium	27.9	0.000142	0.0039618	0.00051	0.0061	0.000003111	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	58.1	0.000142	0.0082502	3	0.0061	0.0183	147	100	0.005778	0.849366	1	0.02	43.79581	225	0.19	22.5	**1.95**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 22. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000142	0.000781	0.0007	0.0061	0.00000427	4	100	0.005778	0.023112	1	0.02	1.1948635	9.63	0.12	1.91	0.63
Cadmium	0.36	0.000142	0.00005112	0.053	0.0061	0.0003233	2.1	100	0.005778	0.0121338	1	0.02	0.625411	2.3	0.27	0.23	**2.72**
Chromium	13.9	0.000142	0.0019738	0.0081	0.0061	0.00004941	0.7	100	0.005778	0.0040446	1	0.02	0.3033905	56.8	0.01	5.68	0.05
Cobalt	8.3	0.000142	0.0011786	0.06	0.0061	0.000366	0.3	100	0.005778	0.0017334	1	0.02	0.1639	20	0.01	5	0.03
Copper	15.4	0.000142	0.0021868	0.08	0.0061	0.000488	5	100	0.005778	0.02889	1	0.02	1.57824	35.4	0.04	24.3	0.06
Lead	16.1	0.000142	0.0022862	0.0001	0.0061	0.00000061	0.5	100	0.005778	0.002889	1	0.02	0.2587905	80	0.00	8	0.03
Manganese	623	0.000142	0.088466	91.2	0.0061	0.55632	610	100	0.005778	3.52458	1	0.02	208.4683	268	0.78	83	**2.51**
Molybdenum	1.8	0.000142	0.0002556	NM	0.0061	N/A	NN	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	12.3	0.000142	0.0017466	1.38	0.0061	0.008418	5	100	0.005778	0.02889	1	0.02	1.95273	42.1	0.05	23.1	0.08
Selenium	0.76	0.000142	0.00010792	0.0005	0.0061	0.00000305	0.05	100	0.005778	0.0002889	1	0.02	0.0199935	0.25	0.08	0.025	0.80
Thallium	0.17	0.000142	0.00002414	0.00005	0.0061	0.000000305	0.05	100	0.005778	0.0002889	1	0.02	0.01566725	0.74	0.02	0.074	0.21
Uranium	15.5	0.000142	0.002201	0.727	0.0061	0.0044347	4.381676	100	0.005778	0.0253173	1	0.02	1.597651196	5	0.32	0.5	**3.20**
Vanadium	27.9	0.000142	0.0039618	0.00051	0.0061	0.000003111	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	58.1	0.000142	0.0082502	3	0.0061	0.0183	40	100	0.005778	0.23112	1	0.02	12.88351	225	0.06	22.5	0.57

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 16. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.666			13.5			100	1.554		1	22					
Arsenic	5.5	0.666	3.663	0.0007	13.5	0.00945	4	100	1.554	6.216	1	22	0.449475	9.63	0.05	1.91	0.24
Cadmium	0.36	0.666	0.23976	0.053	13.5	0.7155	2.1	100	1.554	3.2634	1	22	0.191757273	2.3	0.08	0.23	0.83
Chromium	13.9	0.666	9.2574	0.0081	13.5	0.10935	0.7	100	1.554	1.0878	1	22	0.475206818	56.8	0.01	5.68	0.08
Cobalt	8.3	0.666	5.5278	0.06	13.5	0.81	0.3	100	1.554	0.4662	1	22	0.309272727	20	0.02	5	0.06
Copper	15.4	0.666	10.2564	0.08	13.5	1.08	5	100	1.554	7.77	1	22	0.868472727	35.4	0.02	24.3	0.04
Lead	16.1	0.666	10.7226	0.0001	13.5	0.00135	0.5	100	1.554	0.777	1	22	0.522770455	80	0.01	8	0.07
Manganese	623	0.666	414.918	91.2	13.5	1231.2	610	100	1.554	947.94	1	22	117.9117273	268	0.44	83	**1.42**
Molybdenum	1.8	0.666	1.1988	NM	13.5	N/A	NM	100	1.554	N/A	1	22	N/A	1.9	N/A	0.19	N/A
Nickel	12.3	0.666	8.1918	1.38	13.5	18.63	5	100	1.554	7.77	1	22	1.572354545	42.1	0.04	23.1	0.07
Selenium	0.76	0.666	0.50616	0.0005	13.5	0.00675	0.05	100	1.554	0.0777	1	22	0.026845909	0.25	0.11	0.025	**1.07**
Thallium	0.17	0.666	0.11322	0.00005	13.5	0.000675	0.05	100	1.554	0.0777	1	22	0.008708864	0.74	0.01	0.074	0.12
Uranium	15.5	0.666	10.323	0.727	13.5	9.8145	4.381676	100	1.554	6.8091245	1	22	1.224846568	5	0.24	0.5	**2.45**
Vanadium	27.9	0.666	18.5814	0.00051	13.5	0.006885	NM	100	1.554	N/A	1	22	N/A	2.1	N/A	0.21	N/A
Zinc	58.1	0.666	38.6946	3	13.5	40.5	40	100	1.554	62.16	1	22	6.425209091	225	0.03	22.5	0.29

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PD 16. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0122			0.57				100	0.4218		1	7					
Arsenic	5.5	0.0122	0.0671	0.0007	0.57	0.000399	0.071	0.3905	100	0.4218	0.1647129	1	7	0.033173129	9.63	0.00	1.91	0.02
Cadmium	0.36	0.0122	0.004392	0.053	0.57	0.03021	69.561	25.04196	100	0.4218	10.5626987	1	7	1.513900104	2.3	0.66	0.23	**6.58**
Chromium	13.9	0.0122	0.16958	0.0081	0.57	0.004617	0.8	11.12	100	0.4218	4.690416	1	7	0.694944714	56.8	0.01	5.68	0.12
Cobalt	8.3	0.0122	0.10126	0.06	0.57	0.0342	0.18	1.494	100	0.4218	0.6301692	1	7	0.1093756	20	0.01	5	0.02
Copper	15.4	0.0122	0.18788	0.08	0.57	0.0456	1.398	21.5292	100	0.4218	9.08101656	1	7	1.330642366	35.4	0.04	24.3	0.05
Lead	16.1	0.0122	0.19642	0.0001	0.57	0.000057	2.659	42.8099	100	0.4218	18.0572158	1	7	2.607670403	80	0.03	8	0.33
Manganese	623	0.0122	7.6006	91.2	0.57	51.984	0.079	49.217	100	0.4218	20.7597306	1	7	11.47776151	268	0.04	83	0.14
Molybdenum	1.8	0.0122	0.02196	NM	0.57	N/A	1	1.8	100	0.4218	0.75924	1	7	0.1116	1.9	0.06	0.19	0.59
Nickel	12.3	0.0122	0.15006	1.38	0.57	0.7866	1.143	14.0589	100	0.4218	5.93004402	1	7	0.980957717	42.1	0.02	23.1	0.04
Selenium	0.76	0.0122	0.009272	0.0005	0.57	0.000285	1.754	1.33304	100	0.4218	0.56227627	1	7	0.081690467	0.25	0.33	0.025	**3.27**
Thallium	0.17	0.0122	0.002074	0.00005	0.57	0.0000285	0.123	0.02091	100	0.4218	0.00881984	1	7	0.001560334	0.74	0.00	0.074	0.02
Uranium	15.5	0.0122	0.1891	0.727	0.57	0.41439	1	15.5	100	0.4218	6.5379	1	7	1.020198571	5	0.20	0.5	**2.04**
Vanadium	27.9	0.0122	0.34038	0.00051	0.57	0.0002907	0.019	0.5301	100	0.4218	0.22359618	1	7	0.080609554	2.1	0.04	0.21	0.38
Zinc	58.1	0.0122	0.70882	3	0.57	1.71	16.364	950.7484	100	0.4218	401.025675	1	7	57.63492787	225	0.26	22.5	**2.56**

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
BAF:	Bioaccumulation factor
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PE 16. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00868			0.329				100	0.30132		1	3.8					
Arsenic	5.5	0.00868	0.04774	0.0007	0.329	0.0002303	0.071	0.3905	100	0.30132	0.11766546	1	3.8	0.043588358	9.63	0.00	1.91	0.02
Cadmium	0.36	0.00868	0.0031248	0.053	0.329	0.017437	69.561	25.04196	100	0.30132	7.54564339	1	3.8	1.991106628	2.3	0.87	0.23	**8.66**
Chromium	13.9	0.00868	0.120652	0.0081	0.329	0.0026649	0.8	11.12	100	0.30132	3.3506784	1	3.8	0.914209289	56.8	0.02	5.68	0.16
Cobalt	8.3	0.00868	0.072044	0.06	0.329	0.01974	0.18	1.494	100	0.30132	0.45017208	1	3.8	0.142620021	20	0.01	5	0.03
Copper	15.4	0.00868	0.133672	0.08	0.329	0.02632	1.398	21.5292	100	0.30132	6.48717854	1	3.8	1.749255406	35.4	0.05	24.3	0.07
Lead	16.1	0.00868	0.139748	0.0001	0.329	0.0000329	2.659	42.8099	100	0.30132	12.8994791	1	3.8	3.431384202	80	0.04	8	0.43
Manganese	623	0.00868	5.40764	91.2	0.329	30.0048	0.079	49.217	100	0.30132	14.8300664	1	3.8	13.22171222	268	0.05	83	0.16
Molybdenum	1.8	0.00868	0.015624	NM	0.329	N/A	1	1.8	100	0.30132	0.542376	1	3.8	0.146842105	1.9	0.08	0.19	0.77
Nickel	12.3	0.00868	0.106764	1.38	0.329	0.45402	1.143	14.0589	100	0.30132	4.23622775	1	3.8	1.262371513	42.1	0.03	23.1	0.05
Selenium	0.76	0.00868	0.0065968	0.0005	0.329	0.0001645	1.754	1.33304	100	0.30132	0.40167161	1	3.8	0.107482345	0.25	0.43	0.025	**4.30**
Thallium	0.17	0.00868	0.0014756	0.00005	0.329	0.00001645	0.123	0.02091	100	0.30132	0.0063006	1	3.8	0.002050698	0.74	0.00	0.074	0.03
Uranium	15.5	0.00868	0.13454	0.727	0.329	0.239183	1	15.5	100	0.30132	4.67046	1	3.8	1.327416579	5	0.27	0.5	**2.65**
Vanadium	27.9	0.00868	0.242172	0.00051	0.329	0.00016779	0.019	0.5301	100	0.30132	0.15972973	1	3.8	0.105807769	2.1	0.05	0.21	0.50
Zinc	58.1	0.00868	0.504308	3	0.329	0.987	16.364	950.7484	100	0.30132	286.479508	1	3.8	75.78179365	225	0.34	22.5	**3.37**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 16. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000234			0.00157				100	0.004266		1	0.002					
Arsenic	5.5	0.000234	0.001287	0.0007	0.00157	0.000001099	0.925	5.0875	100	0.004266	0.0217033	1	0.002	11.495687	9.63	**1.19**	1.91	**6.02**
Cadmium	0.36	0.000234	0.00008424	0.053	0.00157	0.00008321	190	68.4	100	0.004266	0.2917944	1	0.002	145.980925	2.3	**63.47**	0.23	**634.70**
Chromium	13.9	0.000234	0.0032526	0.0081	0.00157	0.000012717	11.416	158.6824	100	0.004266	0.6769391	1	0.002	340.1022177	56.8	**5.99**	5.68	**59.88**
Cobalt	8.3	0.000234	0.0019422	0.06	0.00157	0.0000942	0.321	2.6643	100	0.004266	0.0113659	1	0.002	6.7011519	20	0.34	5	**1.34**
Copper	15.4	0.000234	0.0036036	0.08	0.00157	0.0001256	5.492	84.5768	100	0.004266	0.3608046	1	0.002	182.2669144	35.4	**5.15**	24.3	**7.50**
Lead	16.1	0.000234	0.0037674	0.0001	0.00157	0.000000157	228.261	3675.0021	100	0.004266	15.677559	1	0.002	7840.663258	80	**98.01**	8	**980.08**
Manganese	623	0.000234	0.145782	91.2	0.00157	0.143184	0.228	142.044	100	0.004266	0.6059597	1	0.002	447.462852	268	**1.67**	83	**5.39**
Molybdenum	1.8	0.000234	0.0004212	NM	0.00157	N/A	2.091	3.7638	100	0.004266	0.0160564	1	0.002	8.2387854	1.9	**4.34**	0.19	**43.36**
Nickel	12.3	0.000234	0.0028782	1.38	0.00157	0.0021666	7.802	95.9646	100	0.004266	0.409385	1	0.002	207.2148918	42.1	**4.92**	23.1	**8.97**
Selenium	0.76	0.000234	0.00017784	0.0005	0.00157	0.000000785	13.733	10.43708	100	0.004266	0.0445246	1	0.002	22.35160414	0.25	**89.41**	0.025	**894.06**
Thallium	0.17	0.000234	0.00003978	0.00005	0.00157	7.85E-08	1	0.17	100	0.004266	0.0007252	1	0.002	0.38253925	0.74	0.52	0.074	**5.17**
Uranium	15.5	0.000234	0.003627	0.727	0.00157	0.00114139	0.063	0.9765	100	0.004266	0.0041657	1	0.002	4.4670695	5	0.89	0.5	**8.93**
Vanadium	27.9	0.000234	0.0065286	0.00051	0.00157	8.007E-07	0.088	2.4552	100	0.004266	0.0104739	1	0.002	8.50164195	2.1	**4.05**	0.21	**40.48**
Zinc	58.1	0.000234	0.0135954	3	0.00157	0.00471	49.51	2876.531	100	0.004266	12.271281	1	0.002	6144.793323	225	**27.31**	22.5	**273.10**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 16. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378			58		42	0.005053		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	5.5	0.000977	0.0053735	0.0007	0.00378	0.000002646	4	58	2.1	42	0.005053	0.01617971	1	0.009	2.395094667	9.63	0.25	1.91	**1.25**
Cadmium	0.36	0.000977	0.00035172	0.053	0.00378	0.00020034	2.1	58	1.3	42	0.005053	0.00891349	1	0.009	1.051728	2.3	0.46	0.23	**4.57**
Chromium	13.9	0.000977	0.0135803	0.0081	0.00378	0.000030618	0.7	58	2.2	42	0.005053	0.00672049	1	0.009	2.259045333	56.8	0.04	5.68	0.40
Cobalt	8.3	0.000977	0.0081091	0.06	0.00378	0.0002268	0.3	58	1.26	42	0.005053	0.00355327	1	0.009	1.321018844	20	0.07	5	0.26
Copper	15.4	0.000977	0.0150458	0.08	0.00378	0.0003024	5	58	69.1	42	0.005053	0.16130187	1	0.009	19.62778511	35.4	0.55	24.3	0.81
Lead	16.1	0.000977	0.0157297	0.0001	0.00378	0.000000378	0.5	58	3.5	42	0.005053	0.00889328	1	0.009	2.735928667	80	0.03	8	0.34
Manganese	623	0.000977	0.608671	91.2	0.00378	0.344736	610	58	108	42	0.005053	2.01695548	1	0.009	330.0402756	268	**1.23**	83	**3.98**
Molybdenum	1.8	0.000977	0.0017586	NM	0.00378	N/A	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	1.9	N/A	0.19	N/A
Nickel	12.3	0.000977	0.0120171	1.38	0.00378	0.0052164	5	58	2	42	0.005053	0.01889822	1	0.009	4.014635556	42.1	0.10	23.1	0.17
Selenium	0.76	0.000977	0.00074252	0.0005	0.00378	0.00000189	0.05	58	0.3	42	0.005053	0.00078322	1	0.009	0.169736111	0.25	0.68	0.025	**6.79**
Thallium	0.17	0.000977	0.00016609	0.00005	0.00378	0.000000189	0.05	58	0.1	42	0.005053	0.00035876	1	0.009	0.058338	0.74	0.08	0.074	0.79
Uranium	15.5	0.000977	0.0151435	0.727	0.00378	0.00274806	4.381676	58	7.52	42	0.005053	0.02880095	1	0.009	5.18805648	5	**1.04**	0.5	**10.38**
Vanadium	27.9	0.000977	0.0272583	0.00051	0.00378	1.9278E-06	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	2.1	N/A	0.21	N/A
Zinc	58.1	0.000977	0.0567637	3	0.00378	0.01134	40	58	152	42	0.005053	0.43981312	1	0.009	56.43520222	225	0.25	22.5	**2.51**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 18. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000538			0.00392			100	0.0122462		1	0.0175					
Arsenic	30	0.0000538	0.001614	0.003	0.00392	0.00001176	2.1	100	0.0122462	0.02571702	1	0.0175	1.562444571	22.8	0.07	5.7	0.27
Cadmium	0.72	0.0000538	0.000038736	0.005	0.00392	0.0000196	1.3	100	0.0122462	0.01592006	1	0.0175	0.9130512	3.4	0.27	0.85	**1.07**
Chromium	14	0.0000538	0.0007532	0.01	0.00392	0.0000392	2.2	100	0.0122462	0.02694164	1	0.0175	1.584802286	5	0.32	1	**1.58**
Cobalt	7.4	0.0000538	0.00039812	0.0019	0.00392	0.000007448	1.26	100	0.0122462	0.015430212	1	0.0175	0.904901714	43.9	0.02	23.1	0.04
Copper	52.2	0.0000538	0.00280836	0.06	0.00392	0.0002352	69.1	100	0.0122462	0.84621242	1	0.0175	48.52891314	33.2	**1.46**	26.9	**1.80**
Lead	16.3	0.0000538	0.00087694	0.0025	0.00392	0.0000098	3.5	100	0.0122462	0.0428617	1	0.0175	2.499910857	15	0.17	1.5	**1.67**
Manganese	1100	0.0000538	0.05918	15.9	0.00392	0.062328	108	100	0.0122462	1.3225896	1	0.0175	82.51986286	9770	0.01	977	0.08
Molybdenum	7.4	0.0000538	0.00039812	NM	0.00392	N/A	NM	100	0.0122462	N/A	1	0.0175	N/A	35.5	N/A	3.55	N/A
Nickel	11.8	0.0000538	0.00063484	0.4	0.00392	0.001568	2	100	0.0122462	0.0244924	1	0.0175	1.525442286	79	0.02	57.2	0.03
Selenium	0.085	0.0000538	0.000004573	0.001	0.00392	0.00000392	0.3	100	0.0122462	0.00367386	1	0.0175	0.210420171	0.8	0.26	0.4	0.53
Thallium	0.49	0.0000538	0.000026362	0.0003	0.00392	0.000001176	0.1	100	0.0122462	0.00122462	1	0.0175	0.071551886	1.2	0.06	0.12	0.60
Uranium	262	0.0000538	0.0140956	0.103	0.00392	0.00040376	7.52	100	0.0122462	0.092091424	1	0.0175	6.090901943	1600	0.00	160	0.04
Vanadium	28.3	0.0000538	0.00152254	0.00025	0.00392	0.00000098	NM	100	0.0122462	N/A	1	0.0175	N/A	114	N/A	11.4	N/A
Zinc	80.9	0.0000538	0.00435242	0.5	0.00392	0.00196	152	100	0.0122462	1.8614224	1	0.0175	106.727704	223.5	0.48	10.5	**10.16**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 18. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000182			0.003			60		40	0.003138		1	0.0114					
Arsenic	30	0.000182	0.00546	0.003	0.003	0.000009	4	60	2.1	40	0.003138	0.01016712	1	0.0114	1.371589474	22.8	0.06	5.7	0.24
Cadmium	0.72	0.000182	0.00013104	0.005	0.003	0.000015	2.1	60	1.3	40	0.003138	0.00558564	1	0.0114	0.502778947	3.4	0.15	0.85	0.59
Chromium	14	0.000182	0.002548	0.01	0.003	0.00003	0.7	60	2.2	40	0.003138	0.0040794	1	0.0114	0.583982456	5	0.12	1	0.58
Cobalt	7.4	0.000182	0.0013468	0.0019	0.003	0.0000057	0.3	60	1.26	40	0.003138	0.002146392	1	0.0114	0.306920351	43.9	0.01	23.1	0.01
Copper	52.2	0.000182	0.0095004	0.06	0.003	0.00018	5	60	69.1	40	0.003138	0.09614832	1	0.0114	9.283221053	33.2	0.28	26.9	0.35
Lead	16.3	0.000182	0.0029666	0.0025	0.003	0.0000075	0.5	60	3.5	40	0.003138	0.0053346	1	0.0114	0.728833333	15	0.05	1.5	0.49
Manganese	1100	0.000182	0.2002	15.9	0.003	0.0477	610	60	108	40	0.003138	1.2840696	1	0.0114	134.3832982	9770	0.01	977	0.14
Molybdenum	7.4	0.000182	0.0013468	NM	0.003	N/A	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	11.8	0.000182	0.0021476	0.4	0.003	0.0012	5	60	2	40	0.003138	0.0119244	1	0.0114	1.339649123	79	0.02	57.2	0.02
Selenium	0.085	0.000182	0.00001547	0.001	0.003	0.000003	0.05	60	0.3	40	0.003138	0.0004707	1	0.0114	0.042909649	0.8	0.05	0.4	0.11
Thallium	0.49	0.000182	0.00008918	0.0003	0.003	0.0000009	0.05	60	0.1	40	0.003138	0.00021966	1	0.0114	0.027170175	1.2	0.02	0.12	0.23
Uranium	262	0.000182	0.047684	0.103	0.003	0.000309	4.381676	60	7.52	40	0.003138	0.017688924	1	0.0114	5.761572243	1,600	0.00	160	0.04
Vanadium	28.3	0.000182	0.0051506	0.00025	0.003	0.00000075	NM	60	NM	40	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	80.9	0.000182	0.0147238	0.5	0.003	0.0015	40	60	152	40	0.003138	0.2661024	1	0.0114	24.76545614	223.5	0.11	10.5	**2.36**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 18. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000182			0.003			100	0.003138		1	0.0114					
Arsenic	30	0.000182	0.00546	0.003	0.003	0.000009	4	100	0.003138	0.012552	1	0.0114	1.580789474	22.8	0.07	5.7	0.28
Cadmium	0.72	0.000182	0.00013104	0.005	0.003	0.000015	2.1	100	0.003138	0.0065898	1	0.0114	0.590863158	3.4	0.17	0.85	0.70
Chromium	14	0.000182	0.002548	0.01	0.003	0.00003	0.7	100	0.003138	0.0021966	1	0.0114	0.418824561	5	0.08	1	0.42
Cobalt	7.4	0.000182	0.0013468	0.0019	0.003	0.0000057	0.3	100	0.003138	0.0009414	1	0.0114	0.201219298	43.9	0.00	23.1	0.01
Copper	52.2	0.000182	0.0095004	0.06	0.003	0.00018	5	100	0.003138	0.01569	1	0.0114	2.225473684	33.2	0.07	26.9	0.08
Lead	16.3	0.000182	0.0029666	0.0025	0.003	0.0000075	0.5	100	0.003138	0.001569	1	0.0114	0.398517544	15	0.03	1.5	0.27
Manganese	1100	0.000182	0.2002	15.9	0.003	0.0477	610	100	0.003138	1.91418	1	0.0114	189.6561404	9770	0.02	977	0.19
Molybdenum	7.4	0.000182	0.0013468	NM	0.003	N/A	NM	100	0.003138	N/A	1	0.0114	N/A	35.5	N/A	3.55	N/A
Nickel	11.8	0.000182	0.0021476	0.4	0.003	0.0012	5	100	0.003138	0.01569	1	0.0114	1.669964912	79	0.02	57.2	0.03
Selenium	0.085	0.000182	0.00001547	0.001	0.003	0.000003	0.05	100	0.003138	0.0001569	1	0.0114	0.015383333	0.8	0.02	0.4	0.04
Thallium	0.49	0.000182	0.00008918	0.0003	0.003	0.0000009	0.05	100	0.003138	0.0001569	1	0.0114	0.021664912	1.2	0.02	0.12	0.18
Uranium	262	0.000182	0.047684	0.103	0.003	0.000309	4.381676	100	0.003138	0.0137497	1	0.0114	5.416026253	1600	0.00	160	0.03
Vanadium	28.3	0.000182	0.0051506	0.00025	0.003	0.00000075	NM	100	0.003138	N/A	1	0.0114	N/A	114	N/A	11.4	N/A
Zinc	80.9	0.000182	0.0147238	0.5	0.003	0.0015	40	100	0.003138	0.12552	1	0.0114	12.43366667	223.5	0.06	10.5	**1.18**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 18. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00328			0.0128				100	0.00762		1	0.103					
Arsenic	30	0.00328	0.0984	0.003	0.0128	0.0000384	0.071	2.13	100	0.00762	0.0162306	1	0.103	1.113291262	22.8	0.05	5.7	0.20
Cadmium	0.72	0.00328	0.0023616	0.005	0.0128	0.000064	69.561	50.08392	100	0.00762	0.38163947	1	0.103	3.728787091	3.4	**1.10**	0.85	**4.39**
Chromium	14	0.00328	0.04592	0.01	0.0128	0.000128	0.8	11.2	100	0.00762	0.085344	1	0.103	1.275650485	5	0.26	1	**1.28**
Cobalt	7.4	0.00328	0.024272	0.0019	0.0128	0.00002432	0.18	1.332	100	0.00762	0.01014984	1	0.103	0.334428738	43.9	0.01	23.1	0.01
Copper	52.2	0.00328	0.171216	0.06	0.0128	0.000768	1.398	72.9756	100	0.00762	0.55607407	1	0.103	7.068524971	33.2	0.21	26.9	0.26
Lead	16.3	0.00328	0.053464	0.0025	0.0128	0.000032	2.659	43.3417	100	0.00762	0.33026375	1	0.103	3.725822854	15	0.25	1.5	**2.48**
Manganese	1100	0.00328	3.608	15.9	0.0128	0.20352	0.079	86.9	100	0.00762	0.662178	1	0.103	43.43396117	9770	0.00	977	0.04
Molybdenum	7.4	0.00328	0.024272	NM	0.0128	N/A	1	7.4	100	0.00762	0.056388	1	0.103	0.783106796	35.5	0.02	3.55	0.22
Nickel	11.8	0.00328	0.038704	0.4	0.0128	0.00512	1.143	13.4874	100	0.00762	0.10277399	1	0.103	1.423281437	79	0.02	57.2	0.02
Selenium	0.085	0.00328	0.0002788	0.001	0.0128	0.0000128	1.754	0.14909	100	0.00762	0.00113607	1	0.103	0.013860833	0.8	0.02	0.4	0.03
Thallium	0.49	0.00328	0.0016072	0.0003	0.0128	0.00000384	0.123	0.06027	100	0.00762	0.00045926	1	0.103	0.020099975	1.2	0.02	0.12	0.17
Uranium	262	0.00328	0.85936	0.103	0.0128	0.0013184	1	262	100	0.00762	1.99644	1	0.103	27.73901359	1600	0.02	160	0.17
Vanadium	28.3	0.00328	0.092824	0.00025	0.0128	0.0000032	0.019	0.5377	100	0.00762	0.00409727	1	0.103	0.941014311	114	0.01	11.4	0.08
Zinc	80.9	0.00328	0.265352	0.5	0.0128	0.0064	16.364	1323.8476	100	0.00762	10.0877187	1	0.103	100.5773856	223.5	0.45	10.5	**9.58**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 18. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.02023			0.046				100	0.04697		1	0.68					
Arsenic	30	0.02023	0.6069	0.003	0.046	0.000138	0.071	2.13	100	0.04697	0.1000461	1	0.68	1.039829559	22.8	0.05	5.7	0.18
Cadmium	0.72	0.02023	0.0145656	0.005	0.046	0.00023	69.561	50.08392	100	0.04697	2.35244172	1	0.68	3.481231356	3.4	**1.02**	0.85	**4.10**
Chromium	14	0.02023	0.28322	0.01	0.046	0.00046	0.8	11.2	100	0.04697	0.526064	1	0.68	1.1908	5	0.24	1	**1.19**
Cobalt	7.4	0.02023	0.149702	0.0019	0.046	0.0000874	0.18	1.332	100	0.04697	0.06256404	1	0.68	0.312284471	43.9	0.01	23.1	0.01
Copper	52.2	0.02023	1.056006	0.06	0.046	0.00276	1.398	72.9756	100	0.04697	3.42766393	1	0.68	6.597691076	33.2	0.20	26.9	0.25
Lead	16.3	0.02023	0.329749	0.0025	0.046	0.000115	2.659	43.3417	100	0.04697	2.03575965	1	0.68	3.478858307	15	0.23	1.5	**2.32**
Manganese	1100	0.02023	22.253	15.9	0.046	0.7314	0.079	86.9	100	0.04697	4.081693	1	0.68	39.80307794	9770	0.00	977	0.04
Molybdenum	7.4	0.02023	0.149702	NM	0.046	N/A	1	7.4	100	0.04697	0.347578	1	0.68	0.731294118	35.5	0.02	3.55	0.21
Nickel	11.8	0.02023	0.238714	0.4	0.046	0.0184	1.143	13.4874	100	0.04697	0.63350318	1	0.68	1.309731144	79	0.02	57.2	0.02
Selenium	0.085	0.02023	0.00171955	0.001	0.046	0.000046	1.754	0.14909	100	0.04697	0.00700276	1	0.68	0.01289457	0.8	0.02	0.4	0.03
Thallium	0.49	0.02023	0.0099127	0.0003	0.046	0.0000138	0.123	0.06027	100	0.04697	0.00283088	1	0.68	0.018760856	1.2	0.02	0.12	0.16
Uranium	262	0.02023	5.30026	0.103	0.046	0.004738	1	262	100	0.04697	12.30614	1	0.68	25.89873235	1600	0.02	160	0.16
Vanadium	28.3	0.02023	0.572509	0.00025	0.046	0.0000115	0.019	0.5377	100	0.04697	0.02525577	1	0.68	0.879082749	114	0.01	11.4	0.08
Zinc	80.9	0.02023	1.636607	0.5	0.046	0.023	16.364	1323.8476	100	0.04697	62.1811218	1	0.68	93.88342466	223.5	0.42	10.5	**8.94**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 18. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00189			0.035			100	0.01841		1	0.45					
Arsenic	30	0.00189	0.0567	0.003	0.035	0.000105	4	100	0.01841	0.07364	1	0.45	0.289877778	22.8	0.01	5.7	0.05
Cadmium	0.72	0.00189	0.0013608	0.005	0.035	0.000175	2.1	100	0.01841	0.038661	1	0.45	0.089326222	3.4	0.03	0.85	0.11
Chromium	14	0.00189	0.02646	0.01	0.035	0.00035	0.7	100	0.01841	0.012887	1	0.45	0.088215556	5	0.02	1	0.09
Cobalt	7.4	0.00189	0.013986	0.0019	0.035	0.0000665	0.3	100	0.01841	0.005523	1	0.45	0.043501111	43.9	0.00	23.1	0.00
Copper	52.2	0.00189	0.098658	0.06	0.035	0.0021	5	100	0.01841	0.09205	1	0.45	0.428462222	33.2	0.01	26.9	0.02
Lead	16.3	0.00189	0.030807	0.0025	0.035	0.0000875	0.5	100	0.01841	0.009205	1	0.45	0.08911	15	0.01	1.5	0.06
Manganese	1100	0.00189	2.079	15.9	0.035	0.5565	610	100	0.01841	11.2301	1	0.45	30.81244444	9770	0.00	977	0.03
Molybdenum	7.4	0.00189	0.013986	NM	0.035	N/A	NM	100	0.01841	N/A	1	0.45	N/A	35.5	N/A	3.55	N/A
Nickel	11.8	0.00189	0.022302	0.4	0.035	0.014	5	100	0.01841	0.09205	1	0.45	0.285226667	79	0.00	57.2	0.00
Selenium	0.085	0.00189	0.00016065	0.001	0.035	0.000035	0.05	100	0.01841	0.0009205	1	0.45	0.002480333	0.8	0.00	0.4	0.01
Thallium	0.49	0.00189	0.0009261	0.0003	0.035	0.0000105	0.05	100	0.01841	0.0009205	1	0.45	0.004126889	1.2	0.00	0.12	0.03
Uranium	262	0.00189	0.49518	0.103	0.035	0.003605	4.381676	100	0.01841	0.0806667	1	0.45	1.287670345	1600	0.00	160	0.01
Vanadium	28.3	0.00189	0.053487	0.00025	0.035	0.00000875	NM	100	0.01841	N/A	1	0.45	N/A	114	N/A	11.4	N/A
Zinc	80.9	0.00189	0.152901	0.5	0.035	0.0175	40	100	0.01841	0.7364	1	0.45	2.015113333	223.5	0.01	10.5	0.19

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 18. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0085				100	0.006236		1	0.055					
Arsenic	30	0.000724	0.02172	0.003	0.0085	0.0000255	0.925	27.75	100	0.006236	0.173049	1	0.055	3.541718182	22.8	0.16	5.7	0.62
Cadmium	0.72	0.000724	0.00052128	0.005	0.0085	0.0000425	190	136.8	100	0.006236	0.8530848	1	0.055	15.52088327	3.4	**4.56**	0.85	**18.26**
Chromium	14	0.000724	0.010136	0.01	0.0085	0.000085	11.416	159.824	100	0.006236	0.9966625	1	0.055	18.30697207	5	**3.66**	1	**18.31**
Cobalt	7.4	0.000724	0.0053576	0.0019	0.0085	0.00001615	0.321	2.3754	100	0.006236	0.014813	1	0.055	0.367031716	43.9	0.01	23.1	0.02
Copper	52.2	0.000724	0.0377928	0.06	0.0085	0.00051	5.492	286.6824	100	0.006236	1.7877514	1	0.055	33.2009863	33.2	**1.00**	26.9	**1.23**
Lead	16.3	0.000724	0.0118012	0.0025	0.0085	0.00002125	228.261	3720.6543	100	0.006236	23.202	1	0.055	422.069503	15	**28.14**	1.5	**281.38**
Manganese	1100	0.000724	0.7964	15.9	0.0085	0.13515	0.228	250.8	100	0.006236	1.5639888	1	0.055	45.37343273	9770	0.00	977	0.05
Molybdenum	7.4	0.000724	0.0053576	NM	0.0085	N/A	2.091	15.4734	100	0.006236	0.0964921	1	0.055	1.851813135	35.5	0.05	3.55	0.52
Nickel	11.8	0.000724	0.0085432	0.4	0.0085	0.0034	7.802	92.0636	100	0.006236	0.5741086	1	0.055	10.65548745	79	0.13	57.2	0.19
Selenium	0.085	0.000724	0.00006154	0.001	0.0085	0.0000085	13.733	1.167305	100	0.006236	0.0072793	1	0.055	0.133624618	0.8	0.17	0.4	0.33
Thallium	0.49	0.000724	0.00035476	0.0003	0.0085	0.00000255	1	0.49	100	0.006236	0.0030556	1	0.055	0.062053636	1.2	0.05	0.12	0.52
Uranium	262	0.000724	0.189688	0.103	0.0085	0.0008755	0.063	16.506	100	0.006236	0.1029314	1	0.055	5.3362712	1600	0.00	160	0.03
Vanadium	28.3	0.000724	0.0204892	0.00025	0.0085	0.000002125	0.088	2.4904	100	0.006236	0.0155301	1	0.055	0.654935625	114	0.01	11.4	0.06
Zinc	80.9	0.000724	0.0585716	0.5	0.0085	0.00425	49.51	4005.359	100	0.006236	24.977419	1	0.055	455.2770968	223.5	**2.04**	10.5	**43.36**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 18. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	30	0.000142	0.00426	0.003	0.0061	0.0000183	19	100	0.005778	0.109782	1	0.02	5.703015	9.63	0.59	1.91	**2.99**
Cadmium	0.72	0.000142	0.00010224	0.005	0.0061	0.0000305	4	100	0.005778	0.023112	1	0.02	1.162237	2.3	0.51	0.23	**5.05**
Chromium	14	0.000142	0.001988	0.01	0.0061	0.000061	16	100	0.005778	0.092448	1	0.02	4.72485	56.8	0.08	5.68	0.83
Cobalt	7.4	0.000142	0.0010508	0.0019	0.0061	0.00001159	15	100	0.005778	0.08667	1	0.02	4.3866195	20	0.22	5	0.88
Copper	52.2	0.000142	0.0074124	0.06	0.0061	0.000366	116	100	0.005778	0.670248	1	0.02	33.90132	35.4	0.96	24.3	**1.40**
Lead	16.3	0.000142	0.0023146	0.0025	0.0061	0.00001525	37.9	100	0.005778	0.2189862	1	0.02	11.0658025	80	0.14	8	**1.38**
Manganese	1100	0.000142	0.1562	15.9	0.0061	0.09699	1420	100	0.005778	8.20476	1	0.02	422.8975	268	**1.58**	83	**5.10**
Molybdenum	7.4	0.000142	0.0010508	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	11.8	0.000142	0.0016756	0.4	0.0061	0.00244	26	100	0.005778	0.150228	1	0.02	7.71718	42.1	0.18	23.1	0.33
Selenium	0.085	0.000142	0.00001207	0.001	0.0061	0.0000061	0.5	100	0.005778	0.002889	1	0.02	0.1453585	0.25	0.58	0.025	**5.81**
Thallium	0.49	0.000142	0.00006958	0.0003	0.0061	0.00000183	0.4	100	0.005778	0.0023112	1	0.02	0.1191305	0.74	0.16	0.074	**1.61**
Uranium	262	0.000142	0.037204	0.103	0.0061	0.0006283	876.08901	100	0.005778	5.0620423	1	0.02	254.99373	5	**51.00**	0.5	**509.99**
Vanadium	28.3	0.000142	0.0040186	0.00025	0.0061	0.000001525	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	80.9	0.000142	0.0114878	0.5	0.0061	0.00305	147	100	0.005778	0.849366	1	0.02	43.19519	225	0.19	22.5	**1.92**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 24. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000142			0.0061			100	0.005778		1	0.02					
Arsenic	30	0.000142	0.00426	0.003	0.0061	0.0000183	4	100	0.005778	0.023112	1	0.02	1.369515	9.63	0.14	1.91	0.72
Cadmium	0.72	0.000142	0.00010224	0.005	0.0061	0.0000305	2.1	100	0.005778	0.0121338	1	0.02	0.613327	2.3	0.27	0.23	**2.67**
Chromium	14	0.000142	0.001988	0.01	0.0061	0.000061	0.7	100	0.005778	0.0040446	1	0.02	0.30468	56.8	0.01	5.68	0.05
Cobalt	7.4	0.000142	0.0010508	0.0019	0.0061	0.00001159	0.3	100	0.005778	0.0017334	1	0.02	0.1397895	20	0.01	5	0.03
Copper	52.2	0.000142	0.0074124	0.06	0.0061	0.000366	5	100	0.005778	0.02889	1	0.02	1.83342	35.4	0.05	24.3	0.08
Lead	16.3	0.000142	0.0023146	0.0025	0.0061	0.00001525	0.5	100	0.005778	0.002889	1	0.02	0.2609425	80	0.00	8	0.03
Manganese	1100	0.000142	0.1562	15.9	0.0061	0.09699	610	100	0.005778	3.52458	1	0.02	188.8885	268	0.70	83	**2.28**
Molybdenum	7.4	0.000142	0.0010508	NM	0.0061	N/A	NM	100	0.005778	N/A	1	0.02	N/A	1.9	N/A	0.19	N/A
Nickel	11.8	0.000142	0.0016756	0.4	0.0061	0.00244	5	100	0.005778	0.02889	1	0.02	1.65028	42.1	0.04	23.1	0.07
Selenium	0.085	0.000142	0.00001207	0.001	0.0061	0.0000061	0.05	100	0.005778	0.0002889	1	0.02	0.0153535	0.25	0.06	0.025	0.61
Thallium	0.49	0.000142	0.00006958	0.0003	0.0061	0.00000183	0.05	100	0.005778	0.0002889	1	0.02	0.0180155	0.74	0.02	0.074	0.24
Uranium	262	0.000142	0.037204	0.103	0.0061	0.0006283	4.381676	100	0.005778	0.0253173	1	0.02	3.157481196	5	0.63	0.5	**6.31**
Vanadium	28.3	0.000142	0.0040186	0.00025	0.0061	0.000001525	NM	100	0.005778	N/A	1	0.02	N/A	2.1	N/A	0.21	N/A
Zinc	80.9	0.000142	0.0114878	0.5	0.0061	0.00305	40	100	0.005778	0.23112	1	0.02	12.28289	225	0.05	22.5	0.55

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 18. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 3: Conservative Life History Parameters, Conservative Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.666			13.5			100	1.554		1	22					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.666	19.98	0.003	13.5	0.0405	4	100	1.554	6.216	1	22	1.192568182	9.63	0.12	1.91	0.62
Cadmium	0.72	0.666	0.47952	0.005	13.5	0.0675	2.1	100	1.554	3.2634	1	22	0.173200909	2.3	0.08	0.23	0.75
Chromium	14	0.666	9.324	0.01	13.5	0.135	0.7	100	1.554	1.0878	1	22	0.4794	56.8	0.01	5.68	0.08
Cobalt	7.4	0.666	4.9284	0.0019	13.5	0.02565	0.3	100	1.554	0.4662	1	22	0.246375	20	0.01	5	0.05
Copper	52.2	0.666	34.7652	0.06	13.5	0.81	5	100	1.554	7.77	1	22	1.970236364	35.4	0.06	24.3	0.08
Lead	16.3	0.666	10.8558	0.0025	13.5	0.03375	0.5	100	1.554	0.777	1	22	0.530297727	80	0.01	8	0.07
Manganese	1100	0.666	732.6	15.9	13.5	214.65	610	100	1.554	947.94	1	22	86.145	268	0.32	83	**1.04**
Molybdenum	7.4	0.666	4.9284	NM	13.5	N/A	NM	100	1.554	N/A	1	22	N/A	1.9	N/A	0.19	N/A
Nickel	11.8	0.666	7.8588	0.4	13.5	5.4	5	100	1.554	7.77	1	22	0.955854545	42.1	0.02	23.1	0.04
Selenium	0.085	0.666	0.05661	0.001	13.5	0.0135	0.05	100	1.554	0.0777	1	22	0.006718636	0.25	0.03	0.025	0.27
Thallium	0.49	0.666	0.32634	0.0003	13.5	0.00405	0.05	100	1.554	0.0777	1	22	0.018549545	0.74	0.03	0.074	0.25
Uranium	262	0.666	174.492	0.103	13.5	1.3905	4.381676	100	1.554	6.8091245	1	22	8.30416475	5	**1.66**	0.5	**16.61**
Vanadium	28.3	0.666	18.8478	0.00025	13.5	0.003375	NM	100	1.554	N/A	1	22	N/A	2.1	N/A	0.21	N/A
Zinc	80.9	0.666	53.8794	0.5	13.5	6.75	40	100	1.554	62.16	1	22	5.581336364	225	0.02	22.5	0.25

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 18. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0122			0.57				100	0.4218		1	7					
Arsenic	30	0.0122	0.366	0.003	0.57	0.00171	0.071	2.13	100	0.4218	0.898434	1	7	0.180877714	9.63	0.02	1.91	0.09
Cadmium	0.72	0.0122	0.008784	0.005	0.57	0.00285	69.561	50.08392	100	0.4218	21.1253975	1	7	3.019575922	2.3	**1.31**	0.23	**13.13**
Chromium	14	0.0122	0.1708	0.01	0.57	0.0057	0.8	11.2	100	0.4218	4.72416	1	7	0.700094286	56.8	0.01	5.68	0.12
Cobalt	7.4	0.0122	0.09028	0.0019	0.57	0.001083	0.18	1.332	100	0.4218	0.5618376	1	7	0.093314371	20	0.00	5	0.02
Copper	52.2	0.0122	0.63684	0.06	0.57	0.0342	1.398	72.9756	100	0.4218	30.7811081	1	7	4.493164011	35.4	0.13	24.3	0.18
Lead	16.3	0.0122	0.19886	0.0025	0.57	0.001425	2.659	43.3417	100	0.4218	18.2815291	1	7	2.640259151	80	0.03	8	0.33
Manganese	1100	0.0122	13.42	15.9	0.57	9.063	0.079	86.9	100	0.4218	36.65442	1	7	8.448202857	268	0.03	83	0.10
Molybdenum	7.4	0.0122	0.09028	NM	0.57	N/A	1	7.4	100	0.4218	3.12132	1	7	0.4588	1.9	0.24	0.19	**2.41**
Nickel	11.8	0.0122	0.14396	0.4	0.57	0.228	1.143	13.4874	100	0.4218	5.68898532	1	7	0.865849331	42.1	0.02	23.1	0.04
Selenium	0.085	0.0122	0.001037	0.001	0.57	0.00057	1.754	0.14909	100	0.4218	0.06288616	1	7	0.009213309	0.25	0.04	0.025	0.37
Thallium	0.49	0.0122	0.005978	0.0003	0.57	0.000171	0.123	0.06027	100	0.4218	0.02542189	1	7	0.004510127	0.74	0.01	0.074	0.06
Uranium	262	0.0122	3.1964	0.103	0.57	0.05871	1	262	100	0.4218	110.5116	1	7	16.25238714	5	**3.25**	0.5	**32.50**
Vanadium	28.3	0.0122	0.34526	0.00025	0.57	0.0001425	0.019	0.5377	100	0.4218	0.22680186	1	7	0.08174348	2.1	0.04	0.21	0.39
Zinc	80.9	0.0122	0.98698	0.5	0.57	0.285	16.364	1323.8476	100	0.4218	558.398918	1	7	79.95298538	225	0.36	22.5	**3.55**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 18. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00868			0.329				100	0.30132		1	3.8					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.00868	0.2604	0.003	0.329	0.000987	0.071	2.13	100	0.30132	0.6418116	1	3.8	0.237683842	9.63	0.02	1.91	0.12
Cadmium	0.72	0.00868	0.0062496	0.005	0.329	0.001645	69.561	50.08392	100	0.30132	15.0912868	1	3.8	3.973468783	2.3	**1.73**	0.23	**17.28**
Chromium	14	0.00868	0.12152	0.01	0.329	0.00329	0.8	11.2	100	0.30132	3.374784	1	3.8	0.920945789	56.8	0.02	5.68	0.16
Cobalt	7.4	0.00868	0.064232	0.0019	0.329	0.0006251	0.18	1.332	100	0.30132	0.40135824	1	3.8	0.122688247	20	0.01	5	0.02
Copper	52.2	0.00868	0.453096	0.06	0.329	0.01974	1.398	72.9756	100	0.30132	21.9890078	1	3.8	5.911011524	35.4	0.17	24.3	0.24
Lead	16.3	0.00868	0.141484	0.0025	0.329	0.0008225	2.659	43.3417	100	0.30132	13.059721	1	3.8	3.474217775	80	0.04	8	0.43
Manganese	1100	0.00868	9.548	15.9	0.329	5.2311	0.079	86.9	100	0.30132	26.184708	1	3.8	10.77994947	268	0.04	83	0.13
Molybdenum	7.4	0.00868	0.064232	NM	0.329	N/A	1	7.4	100	0.30132	2.229768	1	3.8	0.603684211	1.9	0.32	0.19	**3.18**
Nickel	11.8	0.00868	0.102424	0.4	0.329	0.1316	1.143	13.4874	100	0.30132	4.06402337	1	3.8	1.131065097	42.1	0.03	23.1	0.05
Selenium	0.085	0.00868	0.0007378	0.001	0.329	0.000329	1.754	0.14909	100	0.30132	0.0449238	1	3.8	0.012102789	0.25	0.05	0.025	0.48
Thallium	0.49	0.00868	0.0042532	0.0003	0.329	0.0000987	0.123	0.06027	100	0.30132	0.01816056	1	3.8	0.005924331	0.74	0.01	0.074	0.08
Uranium	262	0.00868	2.27416	0.103	0.329	0.033887	1	262	100	0.30132	78.94584	1	3.8	21.38260184	5	**4.28**	0.5	**42.77**
Vanadium	28.3	0.00868	0.245644	0.00025	0.329	0.00008225	0.019	0.5377	100	0.30132	0.16201976	1	3.8	0.107301583	2.1	0.05	0.21	0.51
Zinc	80.9	0.00868	0.702212	0.5	0.329	0.1645	16.364	1323.8476	100	0.30132	398.901759	1	3.8	105.2022292	225	0.47	22.5	**4.68**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 18. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, One Dietary Item (Earthworms)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000234			0.00157				100	0.004266		1	0.002					
Arsenic	30	0.000234	0.00702	0.003	0.00157	0.00000471	0.925	27.75	100	0.004266	0.1183815	1	0.002	62.703105	9.63	**6.51**	1.91	**32.83**
Cadmium	0.72	0.000234	0.00016848	0.005	0.00157	0.00000785	190	136.8	100	0.004266	0.5835888	1	0.002	291.882565	2.3	**126.91**	0.23	**1269.05**
Chromium	14	0.000234	0.003276	0.01	0.00157	0.0000157	11.416	159.824	100	0.004266	0.6818092	1	0.002	342.550442	56.8	**6.03**	5.68	**60.31**
Cobalt	7.4	0.000234	0.0017316	0.0019	0.00157	0.000002983	0.321	2.3754	100	0.004266	0.0101335	1	0.002	5.9340197	20	0.30	5	**1.19**
Copper	52.2	0.000234	0.0122148	0.06	0.00157	0.0000942	5.492	286.6824	100	0.004266	1.2229871	1	0.002	617.6480592	35.4	**17.45**	24.3	**25.42**
Lead	16.3	0.000234	0.0038142	0.0025	0.00157	0.000003925	228.261	3720.6543	100	0.004266	15.872311	1	0.002	7938.064684	80	**99.23**	8	**992.26**
Manganese	1100	0.000234	0.2574	15.9	0.00157	0.024963	0.228	250.8	100	0.004266	1.0699128	1	0.002	676.1379	268	**2.52**	83	**8.15**
Molybdenum	7.4	0.000234	0.0017316	NM	0.00157	N/A	2.091	15.4734	100	0.004266	0.0660095	1	0.002	33.8705622	1.9	**17.83**	0.19	**178.27**
Nickel	11.8	0.000234	0.0027612	0.4	0.00157	0.000628	7.802	92.0636	100	0.004266	0.3927433	1	0.002	198.0662588	42.1	**4.70**	23.1	**8.57**
Selenium	0.085	0.000234	0.00001989	0.001	0.00157	0.00000157	13.733	1.167305	100	0.004266	0.0049797	1	0.002	2.500591565	0.25	**10.00**	0.025	**100.02**
Thallium	0.49	0.000234	0.00011466	0.0003	0.00157	0.000000471	1	0.49	100	0.004266	0.0020903	1	0.002	1.1027355	0.74	**1.49**	0.074	**14.90**
Uranium	262	0.000234	0.061308	0.103	0.00157	0.00016171	0.063	16.506	100	0.004266	0.0704146	1	0.002	65.942153	5	**13.19**	0.5	**131.88**
Vanadium	28.3	0.000234	0.0066222	0.00025	0.00157	3.925E-07	0.088	2.4904	100	0.004266	0.010624	1	0.002	8.62331945	2.1	**4.11**	0.21	**41.06**
Zinc	80.9	0.000234	0.0189306	0.5	0.00157	0.000785	49.51	4005.359	100	0.004266	17.086861	1	0.002	8553.288547	225	**38.01**	22.5	**380.15**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 18. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 3: Conservative Life History Parameters, Conservative Metals Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000977			0.00378			58		42	0.005053		1	0.009					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	30	0.000977	0.02931	0.003	0.00378	0.00001134	4	58	2.1	42	0.005053	0.01617971	1	0.009	5.055671778	9.63	0.52	1.91	**2.65**
Cadmium	0.72	0.000977	0.00070344	0.005	0.00378	0.0000189	2.1	58	1.3	42	0.005053	0.00891349	1	0.009	1.070648	2.3	0.47	0.23	**4.65**
Chromium	14	0.000977	0.013678	0.01	0.00378	0.0000378	0.7	58	2.2	42	0.005053	0.00672049	1	0.009	2.270698889	56.8	0.04	5.68	0.40
Cobalt	7.4	0.000977	0.0072298	0.0019	0.00378	0.000007182	0.3	58	1.26	42	0.005053	0.00355327	1	0.009	1.198916844	20	0.06	5	0.24
Copper	52.2	0.000977	0.0509994	0.06	0.00378	0.0002268	5	58	69.1	42	0.005053	0.16130187	1	0.009	23.61422956	35.4	0.67	24.3	0.97
Lead	16.3	0.000977	0.0159251	0.0025	0.00378	0.00000945	0.5	58	3.5	42	0.005053	0.00889328	1	0.009	2.758647778	80	0.03	8	0.34
Manganese	1100	0.000977	1.0747	15.9	0.00378	0.060102	610	58	108	42	0.005053	2.01695548	1	0.009	350.1952756	268	**1.31**	83	**4.22**
Molybdenum	7.4	0.000977	0.0072298	NM	0.00378	N/A	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	1.9	N/A	0.19	N/A
Nickel	11.8	0.000977	0.0115286	0.4	0.00378	0.001512	5	58	2	42	0.005053	0.01889822	1	0.009	3.548757778	42.1	0.08	23.1	0.15
Selenium	0.085	0.000977	0.000083045	0.001	0.00378	0.00000378	0.05	58	0.3	42	0.005053	0.00078322	1	0.009	0.096671111	0.25	0.39	0.025	**3.87**
Thallium	0.49	0.000977	0.00047873	0.0003	0.00378	0.000001134	0.05	58	0.1	42	0.005053	0.00035876	1	0.009	0.093180778	0.74	0.13	0.074	**1.26**
Uranium	262	0.000977	0.255974	0.103	0.00378	0.00038934	4.381676	58	7.52	42	0.005053	0.02880095	1	0.009	31.68492092	5	**6.34**	0.5	**63.37**
Vanadium	28.3	0.000977	0.0276491	0.00025	0.00378	0.000000945	NM	58	NM	42	0.005053	N/A	1	0.009	N/A	2.1	N/A	0.21	N/A
Zinc	80.9	0.000977	0.0790393	0.5	0.00378	0.00189	40	58	152	42	0.005053	0.43981312	1	0.009	57.86026889	225	0.26	22.5	**2.57**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 11. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000142			0.00473		1	0.0231					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.0000142	0.00023217	0.0025	0.00473	0.000011825	1	0.0231	0.010562554	22.8	0.00	5.7	0.00
Cadmium	0.381	0.0000142	5.40931E-06	0.0008803	0.00473	4.16368E-06	1	0.0231	0.000414415	3.4	0.00	0.85	0.00
Chromium	12.813	0.0000142	0.000181938	0.0020391	0.00473	9.64515E-06	1	0.0231	0.008293621	5	0.00	1	0.01
Cobalt	8.806	0.0000142	0.000125049	0.0007656	0.00473	3.62141E-06	1	0.0231	0.005570137	43.9	0.00	23.1	0.00
Copper	20.075	0.0000142	0.000285065	0.0044	0.00473	0.000020812	1	0.0231	0.013241429	33.2	0.00	26.9	0.00
Lead	13.669	0.0000142	0.000194096	0.0006957	0.00473	3.29073E-06	1	0.0231	0.008544891	15	0.00	1.5	0.01
Manganese	744.750	0.0000142	0.01057545	0.0944	0.00473	0.000446512	1	0.0231	0.477141212	9770	0.00	977	0.00
Molybdenum	2.030	0.0000142	0.000028826	NM	0.00473	N/A	1	0.0231	0.001247879	35.5	0.00	3.55	0.00
Nickel	12.581	0.0000142	0.000178654	0.0259003	0.00473	0.000122508	1	0.0231	0.01303732	79	0.00	57.2	0.00
Selenium	0.095	0.0000142	0.000001349	0.0005	0.00473	0.000002365	1	0.0231	0.000160779	0.8	0.00	0.4	0.00
Thallium	0.167	0.0000142	2.36667E-06	0.0015	0.00473	0.000007095	1	0.0231	0.000409596	1.2	0.00	0.12	0.00
Uranium	32.048	0.0000142	0.000455086	0.0505	0.00473	0.000238865	1	0.0231	0.030041183	1600	0.00	160	0.00
Vanadium	25.706	0.0000142	0.000365029	0.0013647	0.00473	6.45497E-06	1	0.0231	0.016081546	114	0.00	11.4	0.00
Zinc	52.363	0.0000142	0.000743548	0.0297351	0.00473	0.000140647	1	0.0231	0.038276826	223.5	0.00	10.5	0.00

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
w.w.:	Wet weight
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PT 11. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000256	0.0041856	0.0025	0.0045	0.00001125	1	0.0218	0.192516055	22.8	0.01	5.7	0.03
Cadmium	0.381	0.000256	0.00009752	0.0008803	0.0045	3.96122E-06	1	0.0218	0.004655102	3.4	0.00	0.85	0.01
Chromium	12.813	0.000256	0.00328	0.0020391	0.0045	9.17614E-06	1	0.0218	0.15087964	5	0.03	1	0.15
Cobalt	8.806	0.000256	0.0022544	0.0007656	0.0045	3.44531E-06	1	0.0218	0.103570886	43.9	0.00	23.1	0.00
Copper	20.075	0.000256	0.0051392	0.0044	0.0045	0.0000198	1	0.0218	0.236651376	33.2	0.01	26.9	0.01
Lead	13.669	0.000256	0.0034992	0.0006957	0.0045	3.13071E-06	1	0.0218	0.160657372	15	0.01	1.5	0.11
Manganese	744.750	0.000256	0.190656	0.0944	0.0045	0.0004248	1	0.0218	8.765174312	9770	0.00	977	0.01
Molybdenum	2.030	0.000256	0.00051968	NM	0.0045	N/A	1	0.0218	0.023838532	35.5	0.00	3.55	0.01
Nickel	12.581	0.000256	0.0032208	0.0259003	0.0045	0.000116551	1	0.0218	0.153089509	79	0.00	57.2	0.00
Selenium	0.095	0.000256	0.00002432	0.0005	0.0045	0.00000225	1	0.0218	0.001218807	0.8	0.00	0.4	0.00
Thallium	0.167	0.000256	4.26667E-05	0.0015	0.0045	0.00000675	1	0.0218	0.00226682	1.2	0.00	0.12	0.02
Uranium	32.048	0.000256	0.008204373	0.0505	0.0045	0.00022725	1	0.0218	0.386771712	1,600	0.00	160	0.00
Vanadium	25.706	0.000256	0.0065808	0.0013647	0.0045	6.14109E-06	1	0.0218	0.302153261	114	0.00	11.4	0.03
Zinc	52.363	0.000256	0.0134048	0.0297351	0.0045	0.000133808	1	0.0218	0.621037069	223.5	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 11. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000256	0.0041856	0.0025	0.0045	0.00001125	1	0.0218	0.192516055	22.8	0.01	5.7	0.03
Cadmium	0.381	0.000256	0.00009752	0.00088	0.0045	3.96122E-06	1	0.0218	0.004655102	3.4	0.00	0.85	0.01
Chromium	12.813	0.000256	0.00328	0.002039	0.0045	9.17614E-06	1	0.0218	0.15087964	5	0.03	1	0.15
Cobalt	8.806	0.000256	0.0022544	0.000766	0.0045	3.44531E-06	1	0.0218	0.103570886	43.9	0.00	23.1	0.00
Copper	20.075	0.000256	0.0051392	0.0044	0.0045	0.0000198	1	0.0218	0.236651376	33.2	0.01	26.9	0.01
Lead	13.669	0.000256	0.0034992	0.000696	0.0045	3.13071E-06	1	0.0218	0.160657372	15	0.01	1.5	0.11
Manganese	744.750	0.000256	0.190656	0.0944	0.0045	0.0004248	1	0.0218	8.765174312	9770	0.00	977	0.01
Molybdenum	2.030	0.000256	0.00051968	NM	0.0045	N/A	1	0.0218	0.023838532	35.5	0.00	3.55	0.01
Nickel	12.581	0.000256	0.0032208	0.0259	0.0045	0.000116551	1	0.0218	0.153089509	79	0.00	57.2	0.00
Selenium	0.095	0.000256	0.00002432	0.0005	0.0045	0.00000225	1	0.0218	0.001218807	0.8	0.00	0.4	0.00
Thallium	0.167	0.000256	4.26667E-05	0.0015	0.0045	0.00000675	1	0.0218	0.00226682	1.2	0.00	0.12	0.02
Uranium	32.048	0.000256	0.008204373	0.0505	0.0045	0.00022725	1	0.0218	0.386771712	1600	0.00	160	0.00
Vanadium	25.706	0.000256	0.0065808	0.001365	0.0045	6.14109E-06	1	0.0218	0.302153261	114	0.00	11.4	0.03
Zinc	52.363	0.000256	0.0134048	0.029735	0.0045	0.000133808	1	0.0218	0.621037069	223.5	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 11. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00038			0.014		1	0.117					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.00038	0.006213	0.0025	0.014	0.000035	1	0.117	0.053401709	22.8	0.00	5.7	0.01
Cadmium	0.381	0.00038	0.000144756	0.00088	0.014	1.23238E-05	1	0.117	0.001342564	3.4	0.00	0.85	0.00
Chromium	12.813	0.00038	0.00486875	0.002039	0.014	2.8548E-05	1	0.117	0.041857248	5	0.01	1	0.04
Cobalt	8.806	0.00038	0.003346375	0.000766	0.014	1.07188E-05	1	0.117	0.028693109	43.9	0.00	23.1	0.00
Copper	20.075	0.00038	0.0076285	0.0044	0.014	0.0000616	1	0.117	0.06572735	33.2	0.00	26.9	0.00
Lead	13.669	0.00038	0.005194125	0.000696	0.014	9.74E-06	1	0.117	0.044477479	15	0.00	1.5	0.03
Manganese	744.750	0.00038	0.283005	0.0944	0.014	0.0013216	1	0.117	2.43014188	9770	0.00	977	0.00
Molybdenum	2.030	0.00038	0.0007714	NM	0.014	N/A	1	0.117	0.006593162	35.5	0.00	3.55	0.00
Nickel	12.581	0.00038	0.004780875	0.0259	0.014	0.000362604	1	0.117	0.043961359	79	0.00	57.2	0.00
Selenium	0.095	0.00038	0.0000361	0.0005	0.014	0.000007	1	0.117	0.000368376	0.8	0.00	0.4	0.00
Thallium	0.167	0.00038	6.33333E-05	0.0015	0.014	0.000021	1	0.117	0.000720798	1.2	0.00	0.12	0.01
Uranium	32.048	0.00038	0.012178367	0.0505	0.014	0.000707	1	0.117	0.110131339	1600	0.00	160	0.00
Vanadium	25.706	0.00038	0.009768375	0.001365	0.014	1.91056E-05	1	0.117	0.083653681	114	0.00	11.4	0.01
Zinc	52.363	0.00038	0.01989775	0.029735	0.014	0.000416292	1	0.117	0.17362429	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 11. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.00151	0.0246885	0.0025	0.075	0.0001875	1	1.436	0.01732312	22.8	0.00	5.7	0.00
Cadmium	0.381	0.00151	0.000575216	0.00088	0.075	6.60203E-05	1	1.436	0.000446543	3.4	0.00	0.85	0.00
Chromium	12.813	0.00151	0.019346875	0.002039	0.075	0.000152936	1	1.436	0.013579255	5	0.00	1	0.01
Cobalt	8.806	0.00151	0.013297438	0.000766	0.075	5.74219E-05	1	1.436	0.009300041	43.9	0.00	23.1	0.00
Copper	20.075	0.00151	0.03031325	0.0044	0.075	0.00033	1	1.436	0.021339311	33.2	0.00	26.9	0.00
Lead	13.669	0.00151	0.020639813	0.000696	0.075	5.21786E-05	1	1.436	0.014409465	15	0.00	1.5	0.01
Manganese	744.750	0.00151	1.1245725	0.0944	0.075	0.00708	1	1.436	0.788058844	9770	0.00	977	0.00
Molybdenum	2.030	0.00151	0.0030653	NM	0.075	N/A	1	1.436	0.00213461	35.5	0.00	3.55	0.00
Nickel	12.581	0.00151	0.018997688	0.0259	0.075	0.001942521	1	1.436	0.014582318	79	0.00	57.2	0.00
Selenium	0.095	0.00151	0.00014345	0.0005	0.075	0.0000375	1	1.436	0.00012601	0.8	0.00	0.4	0.00
Thallium	0.167	0.00151	0.000251667	0.0015	0.075	0.0001125	1	1.436	0.000253598	1.2	0.00	0.12	0.00
Uranium	32.048	0.00151	0.048392983	0.0505	0.075	0.0037875	1	1.436	0.036337384	1600	0.00	160	0.00
Vanadium	25.706	0.00151	0.038816438	0.001365	0.075	0.000102352	1	1.436	0.027102221	114	0.00	11.4	0.00
Zinc	52.363	0.00151	0.079067375	0.029735	0.075	0.002230135	1	1.436	0.056613865	223.5	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 11. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.00213	0.0348255	0.0025	0.038	0.000095	1	0.515	0.067806796	22.8	0.00	5.7	0.01
Cadmium	0.381	0.00213	0.000811397	0.00088	0.038	3.34503E-05	1	0.515	0.00164048	3.4	0.00	0.85	0.00
Chromium	12.813	0.00213	0.027290625	0.002039	0.038	7.74874E-05	1	0.515	0.053141966	5	0.01	1	0.05
Cobalt	8.806	0.00213	0.018757313	0.000766	0.038	2.90938E-05	1	0.515	0.036478459	43.9	0.00	23.1	0.00
Copper	20.075	0.00213	0.04275975	0.0044	0.038	0.0001672	1	0.515	0.083353301	33.2	0.00	26.9	0.00
Lead	13.669	0.00213	0.029114438	0.000696	0.038	2.64371E-05	1	0.515	0.056584223	15	0.00	1.5	0.04
Manganese	744.750	0.00213	1.5863175	0.0944	0.038	0.0035872	1	0.515	3.087193592	9770	0.00	977	0.00
Molybdenum	2.030	0.00213	0.0043239	NM	0.038	N/A	1	0.515	0.008395922	35.5	0.00	3.55	0.00
Nickel	12.581	0.00213	0.026798063	0.0259	0.038	0.000984211	1	0.515	0.053946162	79	0.00	57.2	0.00
Selenium	0.095	0.00213	0.00020235	0.0005	0.038	0.000019	1	0.515	0.000429806	0.8	0.00	0.4	0.00
Thallium	0.167	0.00213	0.000355	0.0015	0.038	0.000057	1	0.515	0.0008	1.2	0.00	0.12	0.01
Uranium	32.048	0.00213	0.06826295	0.0505	0.038	0.001919	1	0.515	0.136275631	1600	0.00	160	0.00
Vanadium	25.706	0.00213	0.054754313	0.001365	0.038	5.18581E-05	1	0.515	0.106419749	114	0.00	11.4	0.01
Zinc	52.363	0.00213	0.111532125	0.029735	0.038	0.001129935	1	0.515	0.218761282	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 11. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0106		1	0.0771					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000724	0.0118374	0.0025	0.0106	0.0000265	1	0.0771	0.153876783	22.8	0.01	5.7	0.03
Cadmium	0.381	0.000724	0.000275799	0.00088	0.0106	9.33086E-06	1	0.0771	0.003698179	3.4	0.00	0.85	0.00
Chromium	12.813	0.000724	0.00927625	0.002039	0.0106	2.16149E-05	1	0.0771	0.120594876	5	0.02	1	0.12
Cobalt	8.806	0.000724	0.006375725	0.000766	0.0106	8.11563E-06	1	0.0771	0.082799489	43.9	0.00	23.1	0.00
Copper	20.075	0.000724	0.0145343	0.0044	0.0106	0.00004664	1	0.0771	0.18911725	33.2	0.01	26.9	0.01
Lead	13.669	0.000724	0.009896175	0.000696	0.0106	7.37457E-06	1	0.0771	0.128450708	15	0.01	1.5	0.09
Manganese	744.750	0.000724	0.539199	0.0944	0.0106	0.00100064	1	0.0771	7.006480415	9770	0.00	977	0.01
Molybdenum	2.030	0.000724	0.00146972	NM	0.0106	N/A	1	0.0771	0.019062516	35.5	0.00	3.55	0.01
Nickel	12.581	0.000724	0.009108825	0.0259	0.0106	0.000274543	1	0.0771	0.121703865	79	0.00	57.2	0.00
Selenium	0.095	0.000724	0.00006878	0.0005	0.0106	0.0000053	1	0.0771	0.00096083	0.8	0.00	0.4	0.00
Thallium	0.167	0.000724	0.000120667	0.0015	0.0106	0.0000159	1	0.0771	0.001771293	1.2	0.00	0.12	0.01
Uranium	32.048	0.000724	0.023202993	0.0505	0.0106	0.0005353	1	0.0771	0.307889667	1600	0.00	160	0.00
Vanadium	25.706	0.000724	0.018611325	0.001365	0.0106	1.44657E-05	1	0.0771	0.241579646	114	0.00	11.4	0.02
Zinc	52.363	0.000724	0.03791045	0.029735	0.0106	0.000315192	1	0.0771	0.495793028	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 11. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000111	0.00181485	0.0025	0.0061	0.00001525	1	0.0394	0.046449239	9.63	0.00	1.91	0.02
Cadmium	0.381	0.000111	4.22841E-05	0.00088	0.0061	5.36965E-06	1	0.0394	0.001209485	2.3	0.00	0.23	0.01
Chromium	12.813	0.000111	0.001422188	0.002039	0.0061	1.24388E-05	1	0.0394	0.036411834	56.8	0.00	5.68	0.01
Cobalt	8.806	0.000111	0.000977494	0.000766	0.0061	4.67031E-06	1	0.0394	0.024928022	20	0.00	5	0.00
Copper	20.075	0.000111	0.002228325	0.0044	0.0061	0.00002684	1	0.0394	0.05723769	35.4	0.00	24.3	0.00
Lead	13.669	0.000111	0.001517231	0.000696	0.0061	4.24386E-06	1	0.0394	0.038616119	80	0.00	8	0.00
Manganese	744.750	0.000111	0.08266725	0.0944	0.0061	0.00057584	1	0.0394	2.112768782	268	0.01	83	0.03
Molybdenum	2.030	0.000111	0.00022533	NM	0.0061	N/A	1	0.0394	0.005719036	1.9	0.00	0.19	0.03
Nickel	12.581	0.000111	0.001396519	0.0259	0.0061	0.000157992	1	0.0394	0.039454581	42.1	0.00	23.1	0.00
Selenium	0.095	0.000111	0.000010545	0.0005	0.0061	0.00000305	1	0.0394	0.000345051	0.25	0.00	0.025	0.01
Thallium	0.167	0.000111	1.85E-05	0.0015	0.0061	0.00000915	1	0.0394	0.000701777	0.74	0.00	0.074	0.01
Uranium	32.048	0.000111	0.003557365	0.0505	0.0061	0.00030805	1	0.0394	0.09810698	5	0.02	0.5	0.20
Vanadium	25.706	0.000111	0.002853394	0.001365	0.0061	8.32459E-06	1	0.0394	0.072632445	2.1	0.03	0.21	0.35
Zinc	52.363	0.000111	0.005812238	0.029735	0.0061	0.000181384	1	0.0394	0.152122381	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 11. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.083	1.35705	0.0025	3.61	0.009025	1	68.6	0.01991363	9.63	0.00	1.91	0.01
Cadmium	0.381	0.083	0.031617813	0.00088	3.61	0.003177776	1	68.6	0.000507224	2.3	0.00	0.23	0.00
Chromium	12.813	0.083	1.0634375	0.002039	3.61	0.007361306	1	68.6	0.015609312	56.8	0.00	5.68	0.00
Cobalt	8.806	0.083	0.73091875	0.000766	3.61	0.002763906	1	68.6	0.010695082	20	0.00	5	0.00
Copper	20.075	0.083	1.666225	0.0044	3.61	0.015884	1	68.6	0.024520539	35.4	0.00	24.3	0.00
Lead	13.669	0.083	1.13450625	0.000696	3.61	0.002511529	1	68.6	0.016574603	80	0.00	8	0.00
Manganese	744.750	0.083	61.81425	0.0944	3.61	0.340784	1	68.6	0.906050058	268	0.00	83	0.01
Molybdenum	2.030	0.083	0.16849	NM	3.61	N/A	1	68.6	0.002456122	1.9	0.00	0.19	0.01
Nickel	12.581	0.083	1.04424375	0.0259	3.61	0.093500031	1	68.6	0.016585186	42.1	0.00	23.1	0.00
Selenium	0.095	0.083	0.007885	0.0005	3.61	0.001805	1	68.6	0.000141254	0.25	0.00	0.025	0.01
Thallium	0.167	0.083	0.013833333	0.0015	3.61	0.005415	1	68.6	0.000280588	0.74	0.00	0.074	0.00
Uranium	32.048	0.083	2.660011666	0.0505	3.61	0.182305	1	68.6	0.041433188	5	0.01	0.5	0.08
Vanadium	25.706	0.083	2.13361875	0.001365	3.61	0.004926522	1	68.6	0.031174129	2.1	0.01	0.21	0.15
Zinc	52.363	0.083	4.3460875	0.029735	3.61	0.107343838	1	68.6	0.064918824	225	0.00	22.5	0.00

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PD 11. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.0072	0.11772	0.0025	1.02	0.00255	1	13.3	0.009042857	9.63	0.00	1.91	0.00
Cadmium	0.381	0.0072	0.00274275	0.00088	1.02	0.000897876	1	13.3	0.000273731	2.3	0.00	0.23	0.00
Chromium	12.813	0.0072	0.09225	0.002039	1.02	0.002079926	1	13.3	0.007092476	56.8	0.00	5.68	0.00
Cobalt	8.806	0.0072	0.063405	0.000766	1.02	0.000780938	1	13.3	0.00482601	20	0.00	5	0.00
Copper	20.075	0.0072	0.14454	0.0044	1.02	0.004488	1	13.3	0.011205113	35.4	0.00	24.3	0.00
Lead	13.669	0.0072	0.098415	0.000696	1.02	0.000709629	1	13.3	0.00745298	80	0.00	8	0.00
Manganese	744.750	0.0072	5.3622	0.0944	1.02	0.096288	1	13.3	0.410412632	268	0.00	83	0.00
Molybdenum	2.030	0.0072	0.014616	NM	1.02	N/A	1	13.3	0.001098947	1.9	0.00	0.19	0.01
Nickel	12.581	0.0072	0.090585	0.0259	1.02	0.026418291	1	13.3	0.00879724	42.1	0.00	23.1	0.00
Selenium	0.095	0.0072	0.000684	0.0005	1.02	0.00051	1	13.3	8.97744E-05	0.25	0.00	0.025	0.00
Thallium	0.167	0.0072	0.0012	0.0015	1.02	0.00153	1	13.3	0.000205263	0.74	0.00	0.074	0.00
Uranium	32.048	0.0072	0.230748	0.0505	1.02	0.05151	1	13.3	0.021222406	5	0.00	0.5	0.04
Vanadium	25.706	0.0072	0.185085	0.001365	1.02	0.001391981	1	13.3	0.014020826	2.1	0.01	0.21	0.07
Zinc	52.363	0.0072	0.37701	0.029735	1.02	0.030329838	1	13.3	0.030627055	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 11. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.00529	0.0864915	0.0025	0.73	0.001825	1	9.2	0.00959962	9.63	0.00	1.91	0.01
Cadmium	0.381	0.00529	0.002015159	0.00088	0.73	0.000642597	1	9.2	0.000288887	2.3	0.00	0.23	0.00
Chromium	12.813	0.00529	0.067778125	0.002039	0.73	0.001488574	1	9.2	0.007528989	56.8	0.00	5.68	0.00
Cobalt	8.806	0.00529	0.046585063	0.000766	0.73	0.000558906	1	9.2	0.005124344	20	0.00	5	0.00
Copper	20.075	0.00529	0.10619675	0.0044	0.73	0.003212	1	9.2	0.011892255	35.4	0.00	24.3	0.00
Lead	13.669	0.00529	0.072307688	0.000696	0.73	0.000507871	1	9.2	0.007914735	80	0.00	8	0.00
Manganese	744.750	0.00529	3.9397275	0.0944	0.73	0.068912	1	9.2	0.435721685	268	0.00	83	0.01
Molybdenum	2.030	0.00529	0.0107387	NM	0.73	N/A	1	9.2	0.00116725	1.9	0.00	0.19	0.01
Nickel	12.581	0.00529	0.066554813	0.0259	0.73	0.018907209	1	9.2	0.00928935	42.1	0.00	23.1	0.00
Selenium	0.095	0.00529	0.00050255	0.0005	0.73	0.000365	1	9.2	9.42989E-05	0.25	0.00	0.025	0.00
Thallium	0.167	0.00529	0.000881667	0.0015	0.73	0.001095	1	9.2	0.000214855	0.74	0.00	0.074	0.00
Uranium	32.048	0.00529	0.169535683	0.0505	0.73	0.036865	1	9.2	0.022434857	5	0.00	0.5	0.04
Vanadium	25.706	0.00529	0.135986063	0.001365	0.73	0.000996222	1	9.2	0.014889379	2.1	0.01	0.21	0.07
Zinc	52.363	0.00529	0.276997625	0.029735	0.73	0.021706649	1	9.2	0.032467856	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 11. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000155			0.00231		1	0.00428					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000155	0.00253425	0.0025	0.00231	0.000005775	1	0.00428	0.593463785	9.63	0.06	1.91	0.31
Cadmium	0.381	0.000155	5.90453E-05	0.00088	0.00231	2.03342E-06	1	0.00428	0.014270733	2.3	0.01	0.23	0.06
Chromium	12.813	0.000155	0.001985938	0.002039	0.00231	4.71042E-06	1	0.00428	0.465104654	56.8	0.01	5.68	0.08
Cobalt	8.806	0.000155	0.001364969	0.000766	0.00231	1.76859E-06	1	0.00428	0.319331155	20	0.02	5	0.06
Copper	20.075	0.000155	0.003111625	0.0044	0.00231	0.000010164	1	0.00428	0.729389953	35.4	0.02	24.3	0.03
Lead	13.669	0.000155	0.002118656	0.000696	0.00231	1.6071E-06	1	0.00428	0.495388633	80	0.01	8	0.06
Manganese	744.750	0.000155	0.11543625	0.0944	0.00231	0.000218064	1	0.00428	27.02203598	268	0.10	83	0.33
Molybdenum	2.030	0.000155	0.00031465	NM	0.00231	N/A	1	0.00428	0.073516355	1.9	0.04	0.19	0.39
Nickel	12.581	0.000155	0.001950094	0.0259	0.00231	5.98297E-05	1	0.00428	0.469608273	42.1	0.01	23.1	0.02
Selenium	0.095	0.000155	0.000014725	0.0005	0.00231	0.000001155	1	0.00428	0.00371028	0.25	0.01	0.025	0.15
Thallium	0.167	0.000155	2.58333E-05	0.0015	0.00231	0.000003465	1	0.00428	0.006845405	0.74	0.01	0.074	0.09
Uranium	32.048	0.000155	0.004967492	0.0505	0.00231	0.000116655	1	0.00428	1.187884735	5	0.24	0.5	**2.38**
Vanadium	25.706	0.000155	0.003984469	0.001365	0.00231	3.15243E-06	1	0.00428	0.931687191	2.1	0.44	0.21	**4.44**
Zinc	52.363	0.000155	0.008116188	0.029735	0.00231	6.86882E-05	1	0.00428	1.912354127	225	0.01	22.5	0.08

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 11. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000317	0.00518295	0.0025	0.00229	0.000005725	1	0.0185	0.280468919	9.63	0.03	1.91	0.15
Cadmium	0.381	0.000317	0.000120757	0.00088	0.00229	2.01582E-06	1	0.0185	0.006636379	2.3	0.00	0.23	0.03
Chromium	12.813	0.000317	0.004061563	0.002039	0.00229	4.66964E-06	1	0.0185	0.219796332	56.8	0.00	5.68	0.04
Cobalt	8.806	0.000317	0.002791581	0.000766	0.00229	1.75328E-06	1	0.0185	0.150991056	20	0.01	5	0.03
Copper	20.075	0.000317	0.006363775	0.0044	0.00229	0.000010076	1	0.0185	0.344532486	35.4	0.01	24.3	0.01
Lead	13.669	0.000317	0.004332994	0.000696	0.00229	1.59319E-06	1	0.0185	0.234301997	80	0.00	8	0.03
Manganese	744.750	0.000317	0.23608575	0.0944	0.00229	0.000216176	1	0.0185	12.77307708	268	0.05	83	0.15
Molybdenum	2.030	0.000317	0.00064351	NM	0.00229	N/A	1	0.0185	0.034784324	1.9	0.02	0.19	0.18
Nickel	12.581	0.000317	0.003988256	0.0259	0.00229	5.93117E-05	1	0.0185	0.218787454	42.1	0.01	23.1	0.01
Selenium	0.095	0.000317	0.000030115	0.0005	0.00229	0.000001145	1	0.0185	0.00168973	0.25	0.01	0.025	0.07
Thallium	0.167	0.000317	5.28333E-05	0.0015	0.00229	0.000003435	1	0.0185	0.003041532	0.74	0.00	0.074	0.04
Uranium	32.048	0.000317	0.010159322	0.0505	0.00229	0.000115645	1	0.0185	0.555403604	5	0.11	0.5	**1.11**
Vanadium	25.706	0.000317	0.008148881	0.001365	0.00229	3.12513E-06	1	0.0185	0.440648994	2.1	0.21	0.21	**2.10**
Zinc	52.363	0.000317	0.016598913	0.029735	0.00229	6.80935E-05	1	0.0185	0.900919241	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 7. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000142			0.00473		1	0.0231					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.0000142	0.0002414	0.0111333	0.00473	5.26607E-05	1	0.0231	0.012729899	22.8	0.00	5.7	0.00
Cadmium	0.26	0.0000142	0.000003692	0.0434231	0.00473	0.000205391	1	0.0231	0.009051219	3.4	0.00	0.85	0.01
Chromium	16.5	0.0000142	0.0002343	0.0081833	0.00473	3.87072E-05	1	0.0231	0.011818492	5	0.00	1	0.01
Cobalt	11.5	0.0000142	0.0001633	1.004	0.00473	0.00474892	1	0.0231	0.212650216	43.9	0.00	23.1	0.01
Copper	25.6	0.0000142	0.00036352	0.3128462	0.00473	0.001479762	1	0.0231	0.079795771	33.2	0.00	26.9	0.00
Lead	16	0.0000142	0.0002272	0.0118	0.00473	0.000055814	1	0.0231	0.012251688	15	0.00	1.5	0.01
Manganese	824	0.0000142	0.0117008	88.253	0.00473	0.41743669	1	0.0231	18.57738052	9770	0.00	977	0.02
Molybdenum	10.05	0.0000142	0.00014271	NA	0.00473	N/A	1	0.0231	0.006177922	35.5	0.00	3.55	0.00
Nickel	16	0.0000142	0.0002272	1.553	0.00473	0.00734569	1	0.0231	0.327830736	79	0.00	57.2	0.01
Selenium	4	0.0000142	0.0000568	0.0147333	0.00473	6.96887E-05	1	0.0231	0.0054757	0.8	0.01	0.4	0.01
Thallium	0.37	0.0000142	0.000005254	0.0014917	0.00473	7.05558E-06	1	0.0231	0.000532882	1.2	0.00	0.12	0.00
Uranium	81.4	0.0000142	0.00115588	17.554	0.00473	0.08303042	1	0.0231	3.644428571	1600	0.00	160	0.02
Vanadium	28.2	0.0000142	0.00040044	NM	0.00473	N/A	1	0.0231	0.017335065	114	0.00	11.4	0.00
Zinc	52	0.0000142	0.0007384	3.539	0.00473	0.01673947	1	0.0231	0.756617749	223.5	0.00	10.5	0.07

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 7. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
Arsenic	17	0.000256	0.004352	0.0111333	0.0045	5.01E-05	1	0.0218	0.201931193	22.8	0.01	5.7	0.04
Cadmium	0.26	0.000256	0.00006656	0.0434231	0.0045	0.000195404	1	0.0218	0.01201669	3.4	0.00	0.85	0.01
Chromium	16.5	0.000256	0.004224	0.0081833	0.0045	3.6825E-05	1	0.0218	0.195450688	5	0.04	1	0.20
Cobalt	11.5	0.000256	0.002944	1.004	0.0045	0.004518	1	0.0218	0.342293578	43.9	0.01	23.1	0.01
Copper	25.6	0.000256	0.0065536	0.3128462	0.0045	0.001407808	1	0.0218	0.365202188	33.2	0.01	26.9	0.01
Lead	16	0.000256	0.004096	0.0118	0.0045	0.0000531	1	0.0218	0.190325688	15	0.01	1.5	0.13
Manganese	824	0.000256	0.210944	88.253	0.0045	0.3971385	1	0.0218	27.89369266	9770	0.00	977	0.03
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	1	0.0218	0.118018349	35.5	0.00	3.55	0.03
Nickel	16	0.000256	0.004096	1.553	0.0045	0.0069885	1	0.0218	0.508463303	79	0.01	57.2	0.01
Selenium	4	0.000256	0.001024	0.0147333	0.0045	6.63E-05	1	0.0218	0.050013761	0.8	0.06	0.4	0.13
Thallium	0.37	0.000256	0.00009472	0.0014917	0.0045	6.7125E-06	1	0.0218	0.004652867	1.2	0.00	0.12	0.04
Uranium	81.4	0.000256	0.0208384	17.554	0.0045	0.078993	1	0.0218	4.579422018	1,600	0.00	160	0.03
Vanadium	28.2	0.000256	0.0072192	NM	0.0045	N/A	1	0.0218	0.331155963	114	0.00	11.4	0.03
Zinc	52	0.000256	0.013312	3.539	0.0045	0.0159255	1	0.0218	1.341169725	223.5	0.01	10.5	0.13

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PL 7. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000256	0.004352	0.011133	0.0045	5.01E-05	1	0.0218	0.201931193	22.8	0.01	5.7	0.04
Cadmium	0.26	0.000256	0.00006656	0.043423	0.0045	0.000195404	1	0.0218	0.01201669	3.4	0.00	0.85	0.01
Chromium	16.5	0.000256	0.004224	0.008183	0.0045	3.6825E-05	1	0.0218	0.195450688	5	0.04	1	0.20
Cobalt	11.5	0.000256	0.002944	1.004	0.0045	0.004518	1	0.0218	0.342293578	43.9	0.01	23.1	0.01
Copper	25.6	0.000256	0.0065536	0.312846	0.0045	0.001407808	1	0.0218	0.365202188	33.2	0.01	26.9	0.01
Lead	16	0.000256	0.004096	0.0118	0.0045	0.0000531	1	0.0218	0.190325688	15	0.01	1.5	0.13
Manganese	824	0.000256	0.210944	88.253	0.0045	0.3971385	1	0.0218	27.89369266	9770	0.00	977	0.03
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	1	0.0218	0.118018349	35.5	0.00	3.55	0.03
Nickel	16	0.000256	0.004096	1.553	0.0045	0.0069885	1	0.0218	0.508463303	79	0.01	57.2	0.01
Selenium	4	0.000256	0.001024	0.014733	0.0045	6.63E-05	1	0.0218	0.050013761	0.8	0.06	0.4	0.13
Thallium	0.37	0.000256	0.00009472	0.001492	0.0045	6.7125E-06	1	0.0218	0.004652867	1.2	0.00	0.12	0.04
Uranium	81.4	0.000256	0.0208384	17.554	0.0045	0.078993	1	0.0218	4.579422018	1600	0.00	160	0.03
Vanadium	28.2	0.000256	0.0072192	NM	0.0045	N/A	1	0.0218	0.331155963	114	0.00	11.4	0.03
Zinc	52	0.000256	0.013312	3.539	0.0045	0.0159255	1	0.0218	1.341169725	223.5	0.01	10.5	0.13

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 7. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00038			0.014		1	0.117					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00038	0.00646	0.011133	0.014	0.000155867	1	0.117	0.056545869	22.8	0.00	5.7	0.01
Cadmium	0.26	0.00038	0.0000988	0.043423	0.014	0.000607923	1	0.117	0.006040368	3.4	0.00	0.85	0.01
Chromium	16.5	0.00038	0.00627	0.008183	0.014	0.000114567	1	0.117	0.054568946	5	0.01	1	0.05
Cobalt	11.5	0.00038	0.00437	1.004	0.014	0.014056	1	0.117	0.157487179	43.9	0.00	23.1	0.01
Copper	25.6	0.00038	0.009728	0.312846	0.014	0.004379846	1	0.117	0.120579882	33.2	0.00	26.9	0.00
Lead	16	0.00038	0.00608	0.0118	0.014	0.0001652	1	0.117	0.053377778	15	0.00	1.5	0.04
Manganese	824	0.00038	0.31312	88.253	0.014	1.235542	1	0.117	13.23642735	9770	0.00	977	0.01
Molybdenum	10.05	0.00038	0.003819	NM	0.014	N/A	1	0.117	0.032641026	35.5	0.00	3.55	0.01
Nickel	16	0.00038	0.00608	1.553	0.014	0.021742	1	0.117	0.237794872	79	0.00	57.2	0.00
Selenium	4	0.00038	0.00152	0.014733	0.014	0.000206267	1	0.117	0.014754416	0.8	0.02	0.4	0.04
Thallium	0.37	0.00038	0.0001406	0.001492	0.014	2.08833E-05	1	0.117	0.001380199	1.2	0.00	0.12	0.01
Uranium	81.4	0.00038	0.030932	17.554	0.014	0.245756	1	0.117	2.364854701	1600	0.00	160	0.01
Vanadium	28.2	0.00038	0.010716	NM	0.014	N/A	1	0.117	0.091589744	114	0.00	11.4	0.01
Zinc	52	0.00038	0.01976	3.539	0.014	0.049546	1	0.117	0.592358974	223.5	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 7. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00151	0.02567	0.011133	0.075	0.000835	1	1.436	0.018457521	22.8	0.00	5.7	0.00
Cadmium	0.26	0.00151	0.0003926	0.043423	0.075	0.003256731	1	1.436	0.002541317	3.4	0.00	0.85	0.00
Chromium	16.5	0.00151	0.024915	0.008183	0.075	0.00061375	1	1.436	0.017777681	5	0.00	1	0.02
Cobalt	11.5	0.00151	0.017365	1.004	0.075	0.0753	1	1.436	0.064529944	43.9	0.00	23.1	0.00
Copper	25.6	0.00151	0.038656	0.312846	0.075	0.023463462	1	1.436	0.043258678	33.2	0.00	26.9	0.00
Lead	16	0.00151	0.02416	0.0118	0.075	0.000885	1	1.436	0.017440808	15	0.00	1.5	0.01
Manganese	824	0.00151	1.24424	88.253	0.075	6.618975	1	1.436	5.475776462	9770	0.00	977	0.01
Molybdenum	10.05	0.00151	0.0151755	NM	0.075	N/A	1	1.436	0.010567897	35.5	0.00	3.55	0.00
Nickel	16	0.00151	0.02416	1.553	0.075	0.116475	1	1.436	0.097935237	79	0.00	57.2	0.00
Selenium	4	0.00151	0.00604	0.014733	0.075	0.001105	1	1.436	0.004975627	0.8	0.01	0.4	0.01
Thallium	0.37	0.00151	0.0005587	0.001492	0.075	0.000111875	1	1.436	0.000466974	1.2	0.00	0.12	0.00
Uranium	81.4	0.00151	0.122914	17.554	0.075	1.31655	1	1.436	1.002412256	1600	0.00	160	0.01
Vanadium	28.2	0.00151	0.042582	NM	0.075	N/A	1	1.436	0.029653203	114	0.00	11.4	0.00
Zinc	52	0.00151	0.07852	3.539	0.075	0.265425	1	1.436	0.239516017	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 7. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00213	0.03621	0.011133	0.038	0.000423067	1	0.515	0.071132168	22.8	0.00	5.7	0.01
Cadmium	0.26	0.00213	0.0005538	0.043423	0.038	0.001650077	1	0.515	0.004279373	3.4	0.00	0.85	0.01
Chromium	16.5	0.00213	0.035145	0.008183	0.038	0.000310967	1	0.515	0.068846537	5	0.01	1	0.07
Cobalt	11.5	0.00213	0.024495	1.004	0.038	0.038152	1	0.515	0.12164466	43.9	0.00	23.1	0.01
Copper	25.6	0.00213	0.054528	0.312846	0.038	0.011888154	1	0.515	0.128963406	33.2	0.00	26.9	0.00
Lead	16	0.00213	0.03408	0.0118	0.038	0.0004484	1	0.515	0.067045437	15	0.00	1.5	0.04
Manganese	824	0.00213	1.75512	88.253	0.038	3.353614	1	0.515	9.919871845	9770	0.00	977	0.01
Molybdenum	10.05	0.00213	0.0214065	NM	0.038	N/A	1	0.515	0.041566019	35.5	0.00	3.55	0.01
Nickel	16	0.00213	0.03408	1.553	0.038	0.059014	1	0.515	0.180765049	79	0.00	57.2	0.00
Selenium	4	0.00213	0.00852	0.014733	0.038	0.000559867	1	0.515	0.017630809	0.8	0.02	0.4	0.04
Thallium	0.37	0.00213	0.0007881	0.001492	0.038	5.66833E-05	1	0.515	0.001640356	1.2	0.00	0.12	0.01
Uranium	81.4	0.00213	0.173382	17.554	0.038	0.667052	1	0.515	1.63191068	1600	0.00	160	0.01
Vanadium	28.2	0.00213	0.060066	NM	0.038	N/A	1	0.515	0.11663301	114	0.00	11.4	0.01
Zinc	52	0.00213	0.11076	3.539	0.038	0.134482	1	0.515	0.476198058	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 7. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0106		1	0.0771					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000724	0.012308	0.011133	0.0106	0.000118013	1	0.0771	0.161167488	22.8	0.01	5.7	0.03
Cadmium	0.26	0.000724	0.00018824	0.043423	0.0106	0.000460285	1	0.0771	0.008411474	3.4	0.00	0.85	0.01
Chromium	16.5	0.000724	0.011946	0.008183	0.0106	8.67433E-05	1	0.0771	0.15606671	5	0.03	1	0.16
Cobalt	11.5	0.000724	0.008326	1.004	0.0106	0.0106424	1	0.0771	0.246023346	43.9	0.01	23.1	0.01
Copper	25.6	0.000724	0.0185344	0.312846	0.0106	0.003316169	1	0.0771	0.283405567	33.2	0.01	26.9	0.01
Lead	16	0.000724	0.011584	0.0118	0.0106	0.00012508	1	0.0771	0.151868742	15	0.01	1.5	0.10
Manganese	824	0.000724	0.596576	88.253	0.0106	0.9354818	1	0.0771	19.87104799	9770	0.00	977	0.02
Molybdenum	10.05	0.000724	0.0072762	NM	0.0106	N/A	1	0.0771	0.094373541	35.5	0.00	3.55	0.03
Nickel	16	0.000724	0.011584	1.553	0.0106	0.0164618	1	0.0771	0.363758755	79	0.00	57.2	0.01
Selenium	4	0.000724	0.002896	0.014733	0.0106	0.000156173	1	0.0771	0.039587203	0.8	0.05	0.4	0.10
Thallium	0.37	0.000724	0.00026788	0.001492	0.0106	1.58117E-05	1	0.0771	0.003679529	1.2	0.00	0.12	0.03
Uranium	81.4	0.000724	0.0589336	17.554	0.0106	0.1860724	1	0.0771	3.177769131	1600	0.00	160	0.02
Vanadium	28.2	0.000724	0.0204168	NM	0.0106	N/A	1	0.0771	0.264809339	114	0.00	11.4	0.02
Zinc	52	0.000724	0.037648	3.539	0.0106	0.0375134	1	0.0771	0.974856031	223.5	0.00	10.5	0.09

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 7. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000111	0.001887	0.011133	0.0061	6.79133E-05	1	0.0394	0.04961709	9.63	0.01	1.91	0.03
Cadmium	0.26	0.000111	0.00002886	0.043423	0.0061	0.000264881	1	0.0394	0.007455349	2.3	0.00	0.23	0.03
Chromium	16.5	0.000111	0.0018315	0.008183	0.0061	4.99183E-05	1	0.0394	0.047751734	56.8	0.00	5.68	0.01
Cobalt	11.5	0.000111	0.0012765	1.004	0.0061	0.0061244	1	0.0394	0.187840102	20	0.01	5	0.04
Copper	25.6	0.000111	0.0028416	0.312846	0.0061	0.001908362	1	0.0394	0.120557399	35.4	0.00	24.3	0.00
Lead	16	0.000111	0.001776	0.0118	0.0061	0.00007198	1	0.0394	0.046903046	80	0.00	8	0.01
Manganese	824	0.000111	0.091464	88.253	0.0061	0.5383433	1	0.0394	15.98495685	268	0.06	83	0.19
Molybdenum	10.05	0.000111	0.00111555	NM	0.0061	N/A	1	0.0394	0.028313452	1.9	0.01	0.19	0.15
Nickel	16	0.000111	0.001776	1.553	0.0061	0.0094733	1	0.0394	0.285515228	42.1	0.01	23.1	0.01
Selenium	4	0.000111	0.000444	0.014733	0.0061	8.98733E-05	1	0.0394	0.013550085	0.25	0.05	0.025	0.54
Thallium	0.37	0.000111	0.00004107	0.001492	0.0061	9.09917E-06	1	0.0394	0.001273329	0.74	0.00	0.074	0.02
Uranium	81.4	0.000111	0.0090354	17.554	0.0061	0.1070794	1	0.0394	2.947076142	5	0.59	0.5	**5.89**
Vanadium	28.2	0.000111	0.0031302	NM	0.0061	N/A	1	0.0394	0.079446701	2.1	0.04	0.21	0.38
Zinc	52	0.000111	0.005772	3.539	0.0061	0.0215879	1	0.0394	0.694413706	225	0.00	22.5	0.03

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PB 7. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.083	1.411	0.011133	3.61	0.040191333	1	68.6	0.021154393	9.63	0.00	1.91	0.01
Cadmium	0.26	0.083	0.02158	0.043423	3.61	0.156757308	1	68.6	0.002599669	2.3	0.00	0.23	0.01
Chromium	16.5	0.083	1.3695	0.008183	3.61	0.029541833	1	68.6	0.020394196	56.8	0.00	5.68	0.00
Cobalt	11.5	0.083	0.9545	1.004	3.61	3.62444	1	68.6	0.066748397	20	0.00	5	0.01
Copper	25.6	0.083	2.1248	0.312846	3.61	1.129374615	1	68.6	0.047436948	35.4	0.00	24.3	0.00
Lead	16	0.083	1.328	0.0118	3.61	0.042598	1	68.6	0.019979563	80	0.00	8	0.00
Manganese	824	0.083	68.392	88.253	3.61	318.59333	1	68.6	5.641185569	268	0.02	83	0.07
Molybdenum	10.05	0.083	0.83415	NM	3.61	N/A	1	68.6	0.012159621	1.9	0.01	0.19	0.06
Nickel	16	0.083	1.328	1.553	3.61	5.60633	1	68.6	0.101083528	42.1	0.00	23.1	0.00
Selenium	4	0.083	0.332	0.014733	3.61	0.053187333	1	68.6	0.005614976	0.25	0.02	0.025	0.22
Thallium	0.37	0.083	0.03071	0.001492	3.61	0.005384917	1	68.6	0.000526165	0.74	0.00	0.074	0.01
Uranium	81.4	0.083	6.7562	17.554	3.61	63.36994	1	68.6	1.022246939	5	0.20	0.5	**2.04**
Vanadium	28.2	0.083	2.3406	NM	3.61	N/A	1	68.6	0.034119534	2.1	0.02	0.21	0.16
Zinc	52	0.083	4.316	3.539	3.61	12.77579	1	68.6	0.249151458	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 7. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.0072	0.1224	0.011133	1.02	0.011356	1	13.3	0.010056842	9.63	0.00	1.91	0.01
Cadmium	0.26	0.0072	0.001872	0.043423	1.02	0.044291538	1	13.3	0.003470943	2.3	0.00	0.23	0.02
Chromium	16.5	0.0072	0.1188	0.008183	1.02	0.008347	1	13.3	0.009559925	56.8	0.00	5.68	0.00
Cobalt	11.5	0.0072	0.0828	1.004	1.02	1.02408	1	13.3	0.08322406	20	0.00	5	0.02
Copper	25.6	0.0072	0.18432	0.312846	1.02	0.319103077	1	13.3	0.037851359	35.4	0.00	24.3	0.00
Lead	16	0.0072	0.1152	0.0118	1.02	0.012036	1	13.3	0.009566617	80	0.00	8	0.00
Manganese	824	0.0072	5.9328	88.253	1.02	90.01806	1	13.3	7.214350376	268	0.03	83	0.09
Molybdenum	10.05	0.0072	0.07236	NM	1.02	N/A	1	13.3	0.005440602	1.9	0.00	0.19	0.03
Nickel	16	0.0072	0.1152	1.553	1.02	1.58406	1	13.3	0.12776391	42.1	0.00	23.1	0.01
Selenium	4	0.0072	0.0288	0.014733	1.02	0.015028	1	13.3	0.003295338	0.25	0.01	0.025	0.13
Thallium	0.37	0.0072	0.002664	0.001492	1.02	0.0015215	1	13.3	0.000314699	0.74	0.00	0.074	0.00
Uranium	81.4	0.0072	0.58608	17.554	1.02	17.90508	1	13.3	1.390312782	5	0.28	0.5	**2.78**
Vanadium	28.2	0.0072	0.20304	NM	1.02	N/A	1	13.3	0.015266165	2.1	0.01	0.21	0.07
Zinc	52	0.0072	0.3744	3.539	1.02	3.60978	1	13.3	0.299562406	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 7. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00529	0.08993	0.011133	0.73	0.008127333	1	9.2	0.010658406	9.63	0.00	1.91	0.01
Cadmium	0.26	0.00529	0.0013754	0.043423	0.73	0.031698846	1	9.2	0.003595027	2.3	0.00	0.23	0.02
Chromium	16.5	0.00529	0.087285	0.008183	0.73	0.005973833	1	9.2	0.01013683	56.8	0.00	5.68	0.00
Cobalt	11.5	0.00529	0.060835	1.004	0.73	0.73292	1	9.2	0.086277717	20	0.00	5	0.02
Copper	25.6	0.00529	0.135424	0.312846	0.73	0.228377692	1	9.2	0.039543662	35.4	0.00	24.3	0.00
Lead	16	0.00529	0.08464	0.0118	0.73	0.008614	1	9.2	0.010136304	80	0.00	8	0.00
Manganese	824	0.00529	4.35896	88.253	0.73	64.42469	1	9.2	7.476483696	268	0.03	83	0.09
Molybdenum	10.05	0.00529	0.0531645	NM	0.73	N/A	1	9.2	0.00577875	1.9	0.00	0.19	0.03
Nickel	16	0.00529	0.08464	1.553	0.73	1.13369	1	9.2	0.132427174	42.1	0.00	23.1	0.01
Selenium	4	0.00529	0.02116	0.014733	0.73	0.010755333	1	9.2	0.003469058	0.25	0.01	0.025	0.14
Thallium	0.37	0.00529	0.0019573	0.001492	0.73	0.001088917	1	9.2	0.000331111	0.74	0.00	0.074	0.00
Uranium	81.4	0.00529	0.430606	17.554	0.73	12.81442	1	9.2	1.439676739	5	0.29	0.5	**2.88**
Vanadium	28.2	0.00529	0.149178	NM	0.73	N/A	1	9.2	0.016215	2.1	0.01	0.21	0.08
Zinc	52	0.00529	0.27508	3.539	0.73	2.58347	1	9.2	0.310711957	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 7. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000155			0.00231		1	0.00428					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000155	0.002635	0.011133	0.00231	2.5718E-05	1	0.00428	0.621663084	9.63	0.06	1.91	0.33
Cadmium	0.26	0.000155	0.0000403	0.043423	0.00231	0.000100307	1	0.00428	0.032852175	2.3	0.01	0.23	0.14
Chromium	16.5	0.000155	0.0025575	0.008183	0.00231	1.89035E-05	1	0.00428	0.601963435	56.8	0.01	5.68	0.11
Cobalt	11.5	0.000155	0.0017825	1.004	0.00231	0.00231924	1	0.00428	0.958350467	20	0.05	5	0.19
Copper	25.6	0.000155	0.003968	0.312846	0.00231	0.000722675	1	0.00428	1.095952013	35.4	0.03	24.3	0.05
Lead	16	0.000155	0.00248	0.0118	0.00231	0.000027258	1	0.00428	0.585807944	80	0.01	8	0.07
Manganese	824	0.000155	0.12772	88.253	0.00231	0.20386443	1	0.00428	77.47299766	268	0.29	83	0.93
Molybdenum	10.05	0.000155	0.00155775	NM	0.00231	N/A	1	0.00428	0.36396028	1.9	0.19	0.19	**1.92**
Nickel	16	0.000155	0.00248	1.553	0.00231	0.00358743	1	0.00428	1.417623832	42.1	0.03	23.1	0.06
Selenium	4	0.000155	0.00062	0.014733	0.00231	3.4034E-05	1	0.00428	0.152811682	0.25	0.61	0.025	**6.11**
Thallium	0.37	0.000155	0.00005735	0.001492	0.00231	3.44575E-06	1	0.00428	0.014204614	0.74	0.02	0.074	0.19
Uranium	81.4	0.000155	0.012617	17.554	0.00231	0.04054974	1	0.00428	12.42213551	5	**2.48**	0.5	**24.84**
Vanadium	28.2	0.000155	0.004371	NM	0.00231	N/A	1	0.00428	1.021261682	2.1	0.49	0.21	**4.86**
Zinc	52	0.000155	0.00806	3.539	0.00231	0.00817509	1	0.00428	3.793245327	225	0.02	22.5	0.17

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 7. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000317	0.005389	0.011133	0.00229	2.54953E-05	1	0.0185	0.292675423	9.63	0.03	1.91	0.15
Cadmium	0.26	0.000317	0.00008242	0.043423	0.00229	9.94388E-05	1	0.0185	0.009830208	2.3	0.00	0.23	0.04
Chromium	16.5	0.000317	0.0052305	0.008183	0.00229	1.87398E-05	1	0.0185	0.283742694	56.8	0.00	5.68	0.05
Cobalt	11.5	0.000317	0.0036455	1.004	0.00229	0.00229916	1	0.0185	0.321332973	20	0.02	5	0.06
Copper	25.6	0.000317	0.0081152	0.312846	0.00229	0.000716418	1	0.0185	0.47738474	35.4	0.01	24.3	0.02
Lead	16	0.000317	0.005072	0.0118	0.00229	0.000027022	1	0.0185	0.275622811	80	0.00	8	0.03
Manganese	824	0.000317	0.261208	88.253	0.00229	0.20209937	1	0.0185	25.04364162	268	0.09	83	0.30
Molybdenum	10.05	0.000317	0.00318585	NM	0.00229	N/A	1	0.0185	0.172208108	1.9	0.09	0.19	0.91
Nickel	16	0.000317	0.005072	1.553	0.00229	0.00355637	1	0.0185	0.466398378	42.1	0.01	23.1	0.02
Selenium	4	0.000317	0.001268	0.014733	0.00229	3.37393E-05	1	0.0185	0.070364288	0.25	0.28	0.025	**2.81**
Thallium	0.37	0.000317	0.00011729	0.001492	0.00229	3.41592E-06	1	0.0185	0.006524644	0.74	0.01	0.074	0.09
Uranium	81.4	0.000317	0.0258038	17.554	0.00229	0.04019866	1	0.0185	3.567700541	5	0.71	0.5	**7.14**
Vanadium	28.2	0.000317	0.0089394	NM	0.00229	N/A	1	0.0185	0.483210811	2.1	0.23	0.21	**2.30**
Zinc	52	0.000317	0.016484	3.539	0.00229	0.00810431	1	0.0185	1.329097838	225	0.01	22.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 8. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000142			0.00473		1	0.0231					
Arsenic	17	0.0000142	0.0002414	0.0093778	0.00473	4.43569E-05	1	0.0231	0.012370428	22.8	0.00	5.7	0.00
Cadmium	0.26	0.0000142	0.000003692	0.0445158	0.00473	0.00021056	1	0.0231	0.009274965	3.4	0.00	0.85	0.01
Chromium	16.5	0.0000142	0.0002343	0.0063833	0.00473	3.01932E-05	1	0.0231	0.011449921	5	0.00	1	0.01
Cobalt	11.5	0.0000142	0.0001633	1.196	0.00473	0.00565708	1	0.0231	0.251964502	43.9	0.01	23.1	0.01
Copper	25.6	0.0000142	0.00036352	0.2751579	0.00473	0.001301497	1	0.0231	0.072078651	33.2	0.00	26.9	0.00
Lead	16	0.0000142	0.0002272	0.0045444	0.00473	2.14952E-05	1	0.0231	0.010766027	15	0.00	1.5	0.01
Manganese	824	0.0000142	0.0117008	88.963158	0.00473	0.420795737	1	0.0231	18.7227938	9770	0.00	977	0.02
Molybdenum	10.05	0.0000142	0.00014271	NM	0.00473	N/A	1	0.0231	0.006177922	35.5	0.00	3.55	0.00
Nickel	16	0.0000142	0.0002272	1.748	0.00473	0.00826804	1	0.0231	0.367759307	79	0.00	57.2	0.01
Selenium	4	0.0000142	0.0000568	0.0081444	0.00473	3.85232E-05	1	0.0231	0.004126546	0.8	0.01	0.4	0.01
Thallium	0.37	0.0000142	0.000005254	0.00005	0.00473	2.365E-07	1	0.0231	0.000237684	1.2	0.00	0.12	0.00
Uranium	81.4	0.0000142	0.00115588	17.978	0.00473	0.08503594	1	0.0231	3.731247619	1600	0.00	160	0.02
Vanadium	28.2	0.0000142	0.00040044	0.0005	0.00473	N/A	1	0.0231	0.017335065	114	0.00	11.4	0.00
Zinc	52	0.0000142	0.0007384	3.774	0.00473	0.01785102	1	0.0231	0.804736797	223.5	0.00	10.5	0.08

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 8. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000256	0.004352	0.0093778	0.0045	4.22E-05	1	0.0218	0.201568807	22.8	0.01	5.7	0.04
Cadmium	0.26	0.000256	0.00006656	0.0445158	0.0045	0.000200321	1	0.0218	0.01224225	3.4	0.00	0.85	0.01
Chromium	16.5	0.000256	0.004224	0.0063833	0.0045	2.8725E-05	1	0.0218	0.195079128	5	0.04	1	0.20
Cobalt	11.5	0.000256	0.002944	1.196	0.0045	0.005382	1	0.0218	0.381926606	43.9	0.01	23.1	0.02
Copper	25.6	0.000256	0.0065536	0.2751579	0.0045	0.001238211	1	0.0218	0.357422501	33.2	0.01	26.9	0.01
Lead	16	0.000256	0.004096	0.0045444	0.0045	2.045E-05	1	0.0218	0.188827982	15	0.01	1.5	0.13
Manganese	824	0.000256	0.210944	88.963158	0.0045	0.400334211	1	0.0218	28.04028489	9770	0.00	977	0.03
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	1	0.0218	0.118018349	35.5	0.00	3.55	0.03
Nickel	16	0.000256	0.004096	1.748	0.0045	0.007866	1	0.0218	0.548715596	79	0.01	57.2	0.01
Selenium	4	0.000256	0.001024	0.0081444	0.0045	3.665E-05	1	0.0218	0.04865367	0.8	0.06	0.4	0.12
Thallium	0.37	0.000256	0.00009472	0.00005	0.0045	0.000000225	1	0.0218	0.004355275	1.2	0.00	0.12	0.04
Uranium	81.4	0.000256	0.0208384	17.978	0.0045	0.080901	1	0.0218	4.666944954	1,600	0.00	160	0.03
Vanadium	28.2	0.000256	0.0072192	0.0005	0.0045	N/A	1	0.0218	0.331155963	114	0.00	11.4	0.03
Zinc	52	0.000256	0.013312	3.774	0.0045	0.016983	1	0.0218	1.389678899	223.5	0.01	10.5	0.13

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 8. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
Arsenic	17	0.000256	0.004352	0.009378	0.0045	4.22E-05	1	0.0218	0.201568807	22.8	0.01	5.7	0.04
Cadmium	0.26	0.000256	0.00006656	0.044516	0.0045	0.000200321	1	0.0218	0.01224225	3.4	0.00	0.85	0.01
Chromium	16.5	0.000256	0.004224	0.006383	0.0045	2.8725E-05	1	0.0218	0.195079128	5	0.04	1	0.20
Cobalt	11.5	0.000256	0.002944	1.196	0.0045	0.005382	1	0.0218	0.381926606	43.9	0.01	23.1	0.02
Copper	25.6	0.000256	0.0065536	0.275158	0.0045	0.001238211	1	0.0218	0.357422501	33.2	0.01	26.9	0.01
Lead	16	0.000256	0.004096	0.004544	0.0045	2.045E-05	1	0.0218	0.188827982	15	0.01	1.5	0.13
Manganese	824	0.000256	0.210944	88.96316	0.0045	0.400334211	1	0.0218	28.04028489	9770	0.00	977	0.03
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	1	0.0218	0.118018349	35.5	0.00	3.55	0.03
Nickel	16	0.000256	0.004096	1.748	0.0045	0.007866	1	0.0218	0.548715596	79	0.01	57.2	0.01
Selenium	4	0.000256	0.001024	0.008144	0.0045	3.665E-05	1	0.0218	0.04865367	0.8	0.06	0.4	0.12
Thallium	0.37	0.000256	0.00009472	0.00005	0.0045	0.000000225	1	0.0218	0.004355275	1.2	0.00	0.12	0.04
Uranium	81.4	0.000256	0.0208384	17.978	0.0045	0.080901	1	0.0218	4.666944954	1600	0.00	160	0.03
Vanadium	28.2	0.000256	0.0072192	0.0005	0.0045	N/A	1	0.0218	0.331155963	114	0.00	11.4	0.03
Zinc	52	0.000256	0.013312	3.774	0.0045	0.016983	1	0.0218	1.389678899	223.5	0.01	10.5	0.13

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 8. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014		1	0.117					
Arsenic	17	0.00038	0.00646	0.009378	0.014	0.000131289	1	0.117	0.056335802	22.8	0.00	5.7	0.01
Cadmium	0.26	0.00038	0.0000988	0.044516	0.014	0.000623221	1	0.117	0.00617112	3.4	0.00	0.85	0.01
Chromium	16.5	0.00038	0.00627	0.006383	0.014	8.93667E-05	1	0.117	0.054353561	5	0.01	1	0.05
Cobalt	11.5	0.00038	0.00437	1.196	0.014	0.016744	1	0.117	0.180461538	43.9	0.00	23.1	0.01
Copper	25.6	0.00038	0.009728	0.275158	0.014	0.003852211	1	0.117	0.116070175	33.2	0.00	26.9	0.00
Lead	16	0.00038	0.00608	0.004544	0.014	6.36222E-05	1	0.117	0.052509592	15	0.00	1.5	0.04
Manganese	824	0.00038	0.31312	88.96316	0.014	1.245484211	1	0.117	13.32140351	9770	0.00	977	0.01
Molybdenum	10.05	0.00038	0.003819	NM	0.014	N/A	1	0.117	0.032641026	35.5	0.00	3.55	0.01
Nickel	16	0.00038	0.00608	1.748	0.014	0.024472	1	0.117	0.261128205	79	0.00	57.2	0.00
Selenium	4	0.00038	0.00152	0.008144	0.014	0.000114022	1	0.117	0.013966002	0.8	0.02	0.4	0.03
Thallium	0.37	0.00038	0.0001406	0.00005	0.014	0.0000007	1	0.117	0.001207692	1.2	0.00	0.12	0.01
Uranium	81.4	0.00038	0.030932	17.978	0.014	0.251692	1	0.117	2.415589744	1600	0.00	160	0.02
Vanadium	28.2	0.00038	0.010716	0.0005	0.014	N/A	1	0.117	0.091589744	114	0.00	11.4	0.01
Zinc	52	0.00038	0.01976	3.774	0.014	0.052836	1	0.117	0.620478632	223.5	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 8. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00151	0.02567	0.009378	0.075	0.000703333	1	1.436	0.018365831	22.8	0.00	5.7	0.00
Cadmium	0.26	0.00151	0.0003926	0.044516	0.075	0.003338684	1	1.436	0.002598387	3.4	0.00	0.85	0.00
Chromium	16.5	0.00151	0.024915	0.006383	0.075	0.00047875	1	1.436	0.01768367	5	0.00	1	0.02
Cobalt	11.5	0.00151	0.017365	1.196	0.075	0.0897	1	1.436	0.074557799	43.9	0.00	23.1	0.00
Copper	25.6	0.00151	0.038656	0.275158	0.075	0.020636842	1	1.436	0.04129028	33.2	0.00	26.9	0.00
Lead	16	0.00151	0.02416	0.004544	0.075	0.000340833	1	1.436	0.017061862	15	0.00	1.5	0.01
Manganese	824	0.00151	1.24424	88.96316	0.075	6.672236843	1	1.436	5.512866882	9770	0.00	977	0.01
Molybdenum	10.05	0.00151	0.0151755	NM	0.075	N/A	1	1.436	0.010567897	35.5	0.00	3.55	0.00
Nickel	16	0.00151	0.02416	1.748	0.075	0.1311	1	1.436	0.108119777	79	0.00	57.2	0.00
Selenium	4	0.00151	0.00604	0.008144	0.075	0.000610833	1	1.436	0.0046315	0.8	0.01	0.4	0.01
Thallium	0.37	0.00151	0.0005587	0.00005	0.075	0.00000375	1	1.436	0.000391678	1.2	0.00	0.12	0.00
Uranium	81.4	0.00151	0.122914	17.978	0.075	1.34835	1	1.436	1.024557103	1600	0.00	160	0.01
Vanadium	28.2	0.00151	0.042582	0.0005	0.075	N/A	1	1.436	0.029653203	114	0.00	11.4	0.00
Zinc	52	0.00151	0.07852	3.774	0.075	0.28305	1	1.436	0.251789694	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 8. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00213	0.03621	0.009378	0.038	0.000356356	1	0.515	0.071002632	22.8	0.00	5.7	0.01
Cadmium	0.26	0.00213	0.0005538	0.044516	0.038	0.0016916	1	0.515	0.00436	3.4	0.00	0.85	0.01
Chromium	16.5	0.00213	0.035145	0.006383	0.038	0.000242567	1	0.515	0.068713722	5	0.01	1	0.07
Cobalt	11.5	0.00213	0.024495	1.196	0.038	0.045448	1	0.515	0.13581165	43.9	0.00	23.1	0.01
Copper	25.6	0.00213	0.054528	0.275158	0.038	0.010456	1	0.515	0.126182524	33.2	0.00	26.9	0.00
Lead	16	0.00213	0.03408	0.004544	0.038	0.000172689	1	0.515	0.066510076	15	0.00	1.5	0.04
Manganese	824	0.00213	1.75512	88.96316	0.038	3.3806	1	0.515	9.972271845	9770	0.00	977	0.01
Molybdenum	10.05	0.00213	0.0214065	NM	0.038	N/A	1	0.515	0.041566019	35.5	0.00	3.55	0.01
Nickel	16	0.00213	0.03408	1.748	0.038	0.066424	1	0.515	0.195153398	79	0.00	57.2	0.00
Selenium	4	0.00213	0.00852	0.008144	0.038	0.000309489	1	0.515	0.017144639	0.8	0.02	0.4	0.04
Thallium	0.37	0.00213	0.0007881	0.00005	0.038	0.0000019	1	0.515	0.001533981	1.2	0.00	0.12	0.01
Uranium	81.4	0.00213	0.173382	17.978	0.038	0.683164	1	0.515	1.663196117	1600	0.00	160	0.01
Vanadium	28.2	0.00213	0.060066	0.0005	0.038	N/A	1	0.515	0.11663301	114	0.00	11.4	0.01
Zinc	52	0.00213	0.11076	3.774	0.038	0.143412	1	0.515	0.493537864	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 8. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0106		1	0.0771					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000724	0.012308	0.009378	0.0106	9.94044E-05	1	0.0771	0.160926128	22.8	0.01	5.7	0.03
Cadmium	0.26	0.000724	0.00018824	0.044516	0.0106	0.000471867	1	0.0771	0.008561704	3.4	0.00	0.85	0.01
Chromium	16.5	0.000724	0.011946	0.006383	0.0106	6.76633E-05	1	0.0771	0.155819239	5	0.03	1	0.16
Cobalt	11.5	0.000724	0.008326	1.196	0.0106	0.0126776	1	0.0771	0.272420233	43.9	0.01	23.1	0.01
Copper	25.6	0.000724	0.0185344	0.275158	0.0106	0.002916674	1	0.0771	0.278224043	33.2	0.01	26.9	0.01
Lead	16	0.000724	0.011584	0.004544	0.0106	4.81711E-05	1	0.0771	0.150871221	15	0.01	1.5	0.10
Manganese	824	0.000724	0.596576	88.96316	0.0106	0.943009474	1	0.0771	19.96868319	9770	0.00	977	0.02
Molybdenum	10.05	0.000724	0.0072762	NM	0.0106	N/A	1	0.0771	0.094373541	35.5	0.00	3.55	0.03
Nickel	16	0.000724	0.011584	1.748	0.0106	0.0185288	1	0.0771	0.390568093	79	0.00	57.2	0.01
Selenium	4	0.000724	0.002896	0.008144	0.0106	8.63311E-05	1	0.0771	0.038681337	0.8	0.05	0.4	0.10
Thallium	0.37	0.000724	0.00026788	0.00005	0.0106	0.00000053	1	0.0771	0.003481323	1.2	0.00	0.12	0.03
Uranium	81.4	0.000724	0.0589336	17.978	0.0106	0.1905668	1	0.0771	3.236062257	1600	0.00	160	0.02
Vanadium	28.2	0.000724	0.0204168	0.0005	0.0106	N/A	1	0.0771	0.264809339	114	0.00	11.4	0.02
Zinc	52	0.000724	0.037648	3.774	0.0106	0.0400044	1	0.0771	1.007164721	223.5	0.00	10.5	0.10

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 8. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000111	0.001887	0.009378	0.0061	5.72044E-05	1	0.0394	0.04934529	9.63	0.01	1.91	0.03
Cadmium	0.26	0.000111	0.00002886	0.044516	0.0061	0.000271546	1	0.0394	0.007624526	2.3	0.00	0.23	0.03
Chromium	16.5	0.000111	0.0018315	0.006383	0.0061	3.89383E-05	1	0.0394	0.047473054	56.8	0.00	5.68	0.01
Cobalt	11.5	0.000111	0.0012765	1.196	0.0061	0.0072956	1	0.0394	0.21756599	20	0.01	5	0.04
Copper	25.6	0.000111	0.0028416	0.275158	0.0061	0.001678463	1	0.0394	0.114722415	35.4	0.00	24.3	0.00
Lead	16	0.000111	0.001776	0.004544	0.0061	2.77211E-05	1	0.0394	0.045779724	80	0.00	8	0.01
Manganese	824	0.000111	0.091464	88.96316	0.0061	0.542675263	1	0.0394	16.09490516	268	0.06	83	0.19
Molybdenum	10.05	0.000111	0.00111555	NM	0.0061	N/A	1	0.0394	0.028313452	1.9	0.01	0.19	0.15
Nickel	16	0.000111	0.001776	1.748	0.0061	0.0106628	1	0.0394	0.315705584	42.1	0.01	23.1	0.01
Selenium	4	0.000111	0.000444	0.008144	0.0061	4.96811E-05	1	0.0394	0.012529977	0.25	0.05	0.025	0.50
Thallium	0.37	0.000111	0.00004107	0.00005	0.0061	0.000000305	1	0.0394	0.001050127	0.74	0.00	0.074	0.01
Uranium	81.4	0.000111	0.0090354	17.978	0.0061	0.1096658	1	0.0394	3.012720812	5	0.60	0.5	**6.03**
Vanadium	28.2	0.000111	0.0031302	0.0005	0.0061	N/A	1	0.0394	0.079446701	2.1	0.04	0.21	0.38
Zinc	52	0.000111	0.005772	3.774	0.0061	0.0230214	1	0.0394	0.730796954	225	0.00	22.5	0.03

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PB 8. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.083	1.411	0.009378	3.61	0.033853778	1	68.6	0.021062008	9.63	0.00	1.91	0.01
Cadmium	0.26	0.083	0.02158	0.044516	3.61	0.160702	1	68.6	0.002657172	2.3	0.00	0.23	0.01
Chromium	16.5	0.083	1.3695	0.006383	3.61	0.023043833	1	68.6	0.020299473	56.8	0.00	5.68	0.00
Cobalt	11.5	0.083	0.9545	1.196	3.61	4.31756	1	68.6	0.076852187	20	0.00	5	0.02
Copper	25.6	0.083	2.1248	0.275158	3.61	0.99332	1	68.6	0.045453644	35.4	0.00	24.3	0.00
Lead	16	0.083	1.328	0.004544	3.61	0.016405444	1	68.6	0.019597747	80	0.00	8	0.00
Manganese	824	0.083	68.392	88.96316	3.61	321.157	1	68.6	5.678556852	268	0.02	83	0.07
Molybdenum	10.05	0.083	0.83415	NM	3.61	N/A	1	68.6	0.012159621	1.9	0.01	0.19	0.06
Nickel	16	0.083	1.328	1.748	3.61	6.31028	1	68.6	0.11134519	42.1	0.00	23.1	0.00
Selenium	4	0.083	0.332	0.008144	3.61	0.029401444	1	68.6	0.005268243	0.25	0.02	0.025	0.21
Thallium	0.37	0.083	0.03071	0.00005	3.61	0.0001805	1	68.6	0.000450299	0.74	0.00	0.074	0.01
Uranium	81.4	0.083	6.7562	17.978	3.61	64.90058	1	68.6	1.044559475	5	0.21	0.5	**2.09**
Vanadium	28.2	0.083	2.3406	0.0005	3.61	N/A	1	68.6	0.034119534	2.1	0.02	0.21	0.16
Zinc	52	0.083	4.316	3.774	3.61	13.62414	1	68.6	0.261518076	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 8. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.0072	0.1224	0.009378	1.02	0.009565333	1	13.3	0.009922206	9.63	0.00	1.91	0.01
Cadmium	0.26	0.0072	0.001872	0.044516	1.02	0.045406105	1	13.3	0.003554745	2.3	0.00	0.23	0.02
Chromium	16.5	0.0072	0.1188	0.006383	1.02	0.006511	1	13.3	0.00942188	56.8	0.00	5.68	0.00
Cobalt	11.5	0.0072	0.0828	1.196	1.02	1.21992	1	13.3	0.097948872	20	0.00	5	0.02
Copper	25.6	0.0072	0.18432	0.275158	1.02	0.280661053	1	13.3	0.034960981	35.4	0.00	24.3	0.00
Lead	16	0.0072	0.1152	0.004544	1.02	0.004635333	1	13.3	0.009010175	80	0.00	8	0.00
Manganese	824	0.0072	5.9328	88.96316	1.02	90.74242106	1	13.3	7.268813613	268	0.03	83	0.09
Molybdenum	10.05	0.0072	0.07236	NM	1.02	N/A	1	13.3	0.005440602	1.9	0.00	0.19	0.03
Nickel	16	0.0072	0.1152	1.748	1.02	1.78296	1	13.3	0.142718797	42.1	0.00	23.1	0.01
Selenium	4	0.0072	0.0288	0.008144	1.02	0.008307333	1	13.3	0.002790025	0.25	0.01	0.025	0.11
Thallium	0.37	0.0072	0.002664	0.00005	1.02	0.000051	1	13.3	0.000204135	0.74	0.00	0.074	0.00
Uranium	81.4	0.0072	0.58608	17.978	1.02	18.33756	1	13.3	1.422830075	5	0.28	0.5	**2.85**
Vanadium	28.2	0.0072	0.20304	0.0005	1.02	N/A	1	13.3	0.015266165	2.1	0.01	0.21	0.07
Zinc	52	0.0072	0.3744	3.774	1.02	3.84948	1	13.3	0.317584962	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 8. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00529	0.08993	0.009378	0.73	0.006845778	1	9.2	0.010519106	9.63	0.00	1.91	0.01
Cadmium	0.26	0.00529	0.0013754	0.044516	0.73	0.032496526	1	9.2	0.003681731	2.3	0.00	0.23	0.02
Chromium	16.5	0.00529	0.087285	0.006383	0.73	0.004659833	1	9.2	0.009994004	56.8	0.00	5.68	0.00
Cobalt	11.5	0.00529	0.060835	1.196	0.73	0.87308	1	9.2	0.1015125	20	0.01	5	0.02
Copper	25.6	0.00529	0.135424	0.275158	0.73	0.200865263	1	9.2	0.036553181	35.4	0.00	24.3	0.00
Lead	16	0.00529	0.08464	0.004544	0.73	0.003317444	1	9.2	0.009560592	80	0.00	8	0.00
Manganese	824	0.00529	4.35896	88.96316	0.73	64.94310527	1	9.2	7.532833181	268	0.03	83	0.09
Molybdenum	10.05	0.00529	0.0531645	NM	0.73	N/A	1	9.2	0.00577875	1.9	0.00	0.19	0.03
Nickel	16	0.00529	0.08464	1.748	0.73	1.27604	1	9.2	0.1479	42.1	0.00	23.1	0.01
Selenium	4	0.00529	0.02116	0.008144	0.73	0.005945444	1	9.2	0.002946244	0.25	0.01	0.025	0.12
Thallium	0.37	0.00529	0.0019573	0.00005	0.73	0.0000365	1	9.2	0.000216717	0.74	0.00	0.074	0.00
Uranium	81.4	0.00529	0.430606	17.978	0.73	13.12394	1	9.2	1.473320217	5	0.29	0.5	**2.95**
Vanadium	28.2	0.00529	0.149178	0.0005	0.73	N/A	1	9.2	0.016215	2.1	0.01	0.21	0.08
Zinc	52	0.00529	0.27508	3.774	0.73	2.75502	1	9.2	0.329358696	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 8. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000155			0.00231		1	0.00428					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000155	0.002635	0.009378	0.00231	2.16627E-05	1	0.00428	0.620715576	9.63	0.06	1.91	0.32
Cadmium	0.26	0.000155	0.0000403	0.044516	0.00231	0.000102831	1	0.00428	0.033441933	2.3	0.01	0.23	0.15
Chromium	16.5	0.000155	0.0025575	0.006383	0.00231	1.47455E-05	1	0.00428	0.600991939	56.8	0.01	5.68	0.11
Cobalt	11.5	0.000155	0.0017825	1.196	0.00231	0.00276276	1	0.00428	1.061976636	20	0.05	5	0.21
Copper	25.6	0.000155	0.003968	0.275158	0.00231	0.000635615	1	0.00428	1.07561092	35.4	0.03	24.3	0.04
Lead	16	0.000155	0.00248	0.004544	0.00231	1.04977E-05	1	0.00428	0.581891978	80	0.01	8	0.07
Manganese	824	0.000155	0.12772	88.96316	0.00231	0.205504895	1	0.00428	77.85628382	268	0.29	83	0.94
Molybdenum	10.05	0.000155	0.00155775	NM	0.00231	N/A	1	0.00428	0.36396028	1.9	0.19	0.19	**1.92**
Nickel	16	0.000155	0.00248	1.748	0.00231	0.00403788	1	0.00428	1.522869159	42.1	0.04	23.1	0.07
Selenium	4	0.000155	0.00062	0.008144	0.00231	1.88137E-05	1	0.00428	0.14925553	0.25	0.60	0.025	**5.97**
Thallium	0.37	0.000155	0.00005735	0.00005	0.00231	1.155E-07	1	0.00428	0.013426519	0.74	0.02	0.074	0.18
Uranium	81.4	0.000155	0.012617	17.978	0.00231	0.04152918	1	0.00428	12.65097664	5	**2.53**	0.5	**25.30**
Vanadium	28.2	0.000155	0.004371	0.0005	0.00231	N/A	1	0.00428	1.021261682	2.1	0.49	0.21	**4.86**
Zinc	52	0.000155	0.00806	3.774	0.00231	0.00871794	1	0.00428	3.920079439	225	0.02	22.5	0.17

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 8. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000317	0.005389	0.009378	0.00229	2.14751E-05	1	0.0185	0.292458114	9.63	0.03	1.91	0.15
Cadmium	0.26	0.000317	0.00008242	0.044516	0.00229	0.000101941	1	0.0185	0.009965468	2.3	0.00	0.23	0.04
Chromium	16.5	0.000317	0.0052305	0.006383	0.00229	1.46178E-05	1	0.0185	0.283519883	56.8	0.00	5.68	0.05
Cobalt	11.5	0.000317	0.0036455	1.196	0.00229	0.00273884	1	0.0185	0.345099459	20	0.02	5	0.07
Copper	25.6	0.000317	0.0081152	0.275158	0.00229	0.000630112	1	0.0185	0.472719545	35.4	0.01	24.3	0.02
Lead	16	0.000317	0.005072	0.004544	0.00229	1.04068E-05	1	0.0185	0.274724691	80	0.00	8	0.03
Manganese	824	0.000317	0.261208	88.96316	0.00229	0.203725632	1	0.0185	25.13154765	268	0.09	83	0.30
Molybdenum	10.05	0.000317	0.00318585	NM	0.00229	N/A	1	0.0185	0.172208108	1.9	0.09	0.19	0.91
Nickel	16	0.000317	0.005072	1.748	0.00229	0.00400292	1	0.0185	0.490536216	42.1	0.01	23.1	0.02
Selenium	4	0.000317	0.001268	0.008144	0.00229	1.86508E-05	1	0.0185	0.069548691	0.25	0.28	0.025	**2.78**
Thallium	0.37	0.000317	0.00011729	0.00005	0.00229	1.145E-07	1	0.0185	0.006346189	0.74	0.01	0.074	0.09
Uranium	81.4	0.000317	0.0258038	17.978	0.00229	0.04116962	1	0.0185	3.620184865	5	0.72	0.5	**7.24**
Vanadium	28.2	0.000317	0.0089394	0.0005	0.00229	N/A	1	0.0185	0.483210811	2.1	0.23	0.21	**2.30**
Zinc	52	0.000317	0.016484	3.774	0.00229	0.00864246	1	0.0185	1.358187027	225	0.01	22.5	0.06

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PJ 9. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000142			0.00473		1	0.0231					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.0000142	0.00005396	0.0025	0.00473	0.000011825	1	0.0231	0.002847835	22.8	0.00	5.7	0.00
Cadmium	0.34	0.0000142	0.000004828	0.0008803	0.00473	4.16368E-06	1	0.0231	0.00038925	3.4	0.00	0.85	0.00
Chromium	16.7	0.0000142	0.00023714	0.0020391	0.00473	9.64515E-06	1	0.0231	0.01068334	5	0.00	1	0.01
Cobalt	11	0.0000142	0.0001562	0.0007656	0.00473	3.62141E-06	1	0.0231	0.006918676	43.9	0.00	23.1	0.00
Copper	17.5	0.0000142	0.0002485	0.0044	0.00473	0.000020812	1	0.0231	0.011658528	33.2	0.00	26.9	0.00
Lead	15.2	0.0000142	0.00021584	0.0006957	0.00473	3.29073E-06	1	0.0231	0.009486179	15	0.00	1.5	0.01
Manganese	833	0.0000142	0.0118286	0.0944	0.00473	0.000446512	1	0.0231	0.53139013	9770	0.00	977	0.00
Molybdenum	0.73	0.0000142	0.000010366	NM	0.00473	N/A	1	0.0231	0.000448745	35.5	0.00	3.55	0.00
Nickel	13.3	0.0000142	0.00018886	0.0259003	0.00473	0.000122508	1	0.0231	0.013479149	79	0.00	57.2	0.00
Selenium	0.085	0.0000142	0.000001207	0.0005	0.00473	0.000002365	1	0.0231	0.000154632	0.8	0.00	0.4	0.00
Thallium	0.145625	0.0000142	2.06788E-06	0.0015	0.00473	0.000007095	1	0.0231	0.000396661	1.2	0.00	0.12	0.00
Uranium	6.955	0.0000142	0.000098761	0.0505	0.00473	0.000238865	1	0.0231	0.014615844	1600	0.00	160	0.00
Vanadium	30.8	0.0000142	0.00043736	0.0013647	0.00473	6.45497E-06	1	0.0231	0.019212769	114	0.00	11.4	0.00
Zinc	51.1	0.0000142	0.00072562	0.0297351	0.00473	0.000140647	1	0.0231	0.037500744	223.5	0.00	10.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 9. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Food Items
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.000256	0.0009728	0.0025	0.0045	0.00001125	1	0.0218	0.045139908	22.8	0.00	5.7	0.01
Cadmium	0.34	0.000256	0.00008704	0.0008803	0.0045	3.96122E-06	1	0.0218	0.004174368	3.4	0.00	0.85	0.00
Chromium	16.7	0.000256	0.0042752	0.0020391	0.0045	9.17614E-06	1	0.0218	0.196531016	5	0.04	1	0.20
Cobalt	11	0.000256	0.002816	0.0007656	0.0045	3.44531E-06	1	0.0218	0.129332354	43.9	0.00	23.1	0.01
Copper	17.5	0.000256	0.00448	0.0044	0.0045	0.0000198	1	0.0218	0.206412844	33.2	0.01	26.9	0.01
Lead	15.2	0.000256	0.0038912	0.0006957	0.0045	3.13071E-06	1	0.0218	0.178639024	15	0.01	1.5	0.12
Manganese	833	0.000256	0.213248	0.0944	0.0045	0.0004248	1	0.0218	9.801504587	9770	0.00	977	0.01
Molybdenum	0.73	0.000256	0.00018688	NM	0.0045	N/A	1	0.0218	0.008572477	35.5	0.00	3.55	0.00
Nickel	13.3	0.000256	0.0034048	0.0259003	0.0045	0.000116551	1	0.0218	0.161529875	79	0.00	57.2	0.00
Selenium	0.085	0.000256	0.00002176	0.0005	0.0045	0.00000225	1	0.0218	0.001101376	0.8	0.00	0.4	0.00
Thallium	0.145625	0.000256	0.00003728	0.0015	0.0045	0.00000675	1	0.0218	0.002019725	1.2	0.00	0.12	0.02
Uranium	6.955	0.000256	0.00178048	0.0505	0.0045	0.00022725	1	0.0218	0.092097706	1,600	0.00	160	0.00
Vanadium	30.8	0.000256	0.0078848	0.0013647	0.0045	6.14109E-06	1	0.0218	0.361969775	114	0.00	11.4	0.03
Zinc	51.1	0.000256	0.0130816	0.0297351	0.0045	0.000133808	1	0.0218	0.606211381	223.5	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 9. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
Arsenic	3.8	0.000256	0.0009728	0.0025	0.0045	0.00001125	1	0.0218	0.045139908	22.8	0.00	5.7	0.01
Cadmium	0.34	0.000256	0.00008704	0.00088	0.0045	3.96122E-06	1	0.0218	0.004174368	3.4	0.00	0.85	0.00
Chromium	16.7	0.000256	0.0042752	0.002039	0.0045	9.17614E-06	1	0.0218	0.196531016	5	0.04	1	0.20
Cobalt	11	0.000256	0.002816	0.000766	0.0045	3.44531E-06	1	0.0218	0.129332354	43.9	0.00	23.1	0.01
Copper	17.5	0.000256	0.00448	0.0044	0.0045	0.0000198	1	0.0218	0.206412844	33.2	0.01	26.9	0.01
Lead	15.2	0.000256	0.0038912	0.000696	0.0045	3.13071E-06	1	0.0218	0.178639024	15	0.01	1.5	0.12
Manganese	833	0.000256	0.213248	0.0944	0.0045	0.0004248	1	0.0218	9.801504587	9770	0.00	977	0.01
Molybdenum	0.73	0.000256	0.00018688	NM	0.0045	N/A	1	0.0218	0.008572477	35.5	0.00	3.55	0.00
Nickel	13.3	0.000256	0.0034048	0.0259	0.0045	0.000116551	1	0.0218	0.161529875	79	0.00	57.2	0.00
Selenium	0.085	0.000256	0.00002176	0.0005	0.0045	0.00000225	1	0.0218	0.001101376	0.8	0.00	0.4	0.00
Thallium	0.145625	0.000256	0.00003728	0.0015	0.0045	0.00000675	1	0.0218	0.002019725	1.2	0.00	0.12	0.02
Uranium	6.955	0.000256	0.00178048	0.0505	0.0045	0.00022725	1	0.0218	0.092097706	1600	0.00	160	0.00
Vanadium	30.8	0.000256	0.0078848	0.001365	0.0045	6.14109E-06	1	0.0218	0.361969775	114	0.00	11.4	0.03
Zinc	51.1	0.000256	0.0130816	0.029735	0.0045	0.000133808	1	0.0218	0.606211381	223.5	0.00	10.5	0.06

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 9. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00038			0.014		1	0.117					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.00038	0.001444	0.0025	0.014	0.000035	1	0.117	0.012641026	22.8	0.00	5.7	0.00
Cadmium	0.34	0.00038	0.0001292	0.00088	0.014	1.23238E-05	1	0.117	0.001209605	3.4	0.00	0.85	0.00
Chromium	16.7	0.00038	0.006346	0.002039	0.014	2.8548E-05	1	0.117	0.054483316	5	0.01	1	0.05
Cobalt	11	0.00038	0.00418	0.000766	0.014	1.07188E-05	1	0.117	0.035818109	43.9	0.00	23.1	0.00
Copper	17.5	0.00038	0.00665	0.0044	0.014	0.0000616	1	0.117	0.057364103	33.2	0.00	26.9	0.00
Lead	15.2	0.00038	0.005776	0.000696	0.014	9.74E-06	1	0.117	0.049450769	15	0.00	1.5	0.03
Manganese	833	0.00038	0.31654	0.0944	0.014	0.0013216	1	0.117	2.716765812	9770	0.00	977	0.00
Molybdenum	0.73	0.00038	0.0002774	NM	0.014	N/A	1	0.117	0.00237094	35.5	0.00	3.55	0.00
Nickel	13.3	0.00038	0.005054	0.0259	0.014	0.000362604	1	0.117	0.046295761	79	0.00	57.2	0.00
Selenium	0.085	0.00038	0.0000323	0.0005	0.014	0.000007	1	0.117	0.000335897	0.8	0.00	0.4	0.00
Thallium	0.145625	0.00038	5.53375E-05	0.0015	0.014	0.000021	1	0.117	0.000652457	1.2	0.00	0.12	0.01
Uranium	6.955	0.00038	0.0026429	0.0505	0.014	0.000707	1	0.117	0.028631624	1600	0.00	160	0.00
Vanadium	30.8	0.00038	0.011704	0.001365	0.014	1.91056E-05	1	0.117	0.100197484	114	0.00	11.4	0.01
Zinc	51.1	0.00038	0.019418	0.029735	0.014	0.000416292	1	0.117	0.169523862	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 9. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.00151	0.005738	0.0025	0.075	0.0001875	1	1.436	0.004126393	22.8	0.00	5.7	0.00
Cadmium	0.34	0.00151	0.0005134	0.00088	0.075	6.60203E-05	1	1.436	0.000403496	3.4	0.00	0.85	0.00
Chromium	16.7	0.00151	0.025217	0.002039	0.075	0.000152936	1	1.436	0.017667086	5	0.00	1	0.02
Cobalt	11	0.00151	0.01661	0.000766	0.075	5.74219E-05	1	1.436	0.01160684	43.9	0.00	23.1	0.00
Copper	17.5	0.00151	0.026425	0.0044	0.075	0.00033	1	1.436	0.018631616	33.2	0.00	26.9	0.00
Lead	15.2	0.00151	0.022952	0.000696	0.075	5.21786E-05	1	1.436	0.016019623	15	0.00	1.5	0.01
Manganese	833	0.00151	1.25783	0.0944	0.075	0.00708	1	1.436	0.880856546	9770	0.00	977	0.00
Molybdenum	0.73	0.00151	0.0011023	NM	0.075	N/A	1	1.436	0.000767618	35.5	0.00	3.55	0.00
Nickel	13.3	0.00151	0.020083	0.0259	0.075	0.001942521	1	1.436	0.015338107	79	0.00	57.2	0.00
Selenium	0.085	0.00151	0.00012835	0.0005	0.075	0.0000375	1	1.436	0.000115494	0.8	0.00	0.4	0.00
Thallium	0.145625	0.00151	0.000219894	0.0015	0.075	0.0001125	1	1.436	0.000231472	1.2	0.00	0.12	0.00
Uranium	6.955	0.00151	0.01050205	0.0505	0.075	0.0037875	1	1.436	0.00995094	1600	0.00	160	0.00
Vanadium	30.8	0.00151	0.046508	0.001365	0.075	0.000102352	1	1.436	0.032458462	114	0.00	11.4	0.00
Zinc	51.1	0.00151	0.077161	0.029735	0.075	0.002230135	1	1.436	0.055286306	223.5	0.00	10.5	0.01

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PS 9. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.00213	0.008094	0.0025	0.038	0.000095	1	0.515	0.015900971	22.8	0.00	5.7	0.00
Cadmium	0.34	0.00213	0.0007242	0.00088	0.038	3.34503E-05	1	0.515	0.001471166	3.4	0.00	0.85	0.00
Chromium	16.7	0.00213	0.035571	0.002039	0.038	7.74874E-05	1	0.515	0.069220364	5	0.01	1	0.07
Cobalt	11	0.00213	0.02343	0.000766	0.038	2.90938E-05	1	0.515	0.045551638	43.9	0.00	23.1	0.00
Copper	17.5	0.00213	0.037275	0.0044	0.038	0.0001672	1	0.515	0.072703301	33.2	0.00	26.9	0.00
Lead	15.2	0.00213	0.032376	0.000696	0.038	2.64371E-05	1	0.515	0.062917354	15	0.00	1.5	0.04
Manganese	833	0.00213	1.77429	0.0944	0.038	0.0035872	1	0.515	3.452188738	9770	0.00	977	0.00
Molybdenum	0.73	0.00213	0.0015549	NM	0.038	N/A	1	0.515	0.003019223	35.5	0.00	3.55	0.00
Nickel	13.3	0.00213	0.028329	0.0259	0.038	0.000984211	1	0.515	0.056918856	79	0.00	57.2	0.00
Selenium	0.085	0.00213	0.00018105	0.0005	0.038	0.000019	1	0.515	0.000388447	0.8	0.00	0.4	0.00
Thallium	0.145625	0.00213	0.000310181	0.0015	0.038	0.000057	1	0.515	0.000712973	1.2	0.00	0.12	0.01
Uranium	6.955	0.00213	0.01481415	0.0505	0.038	0.001919	1	0.515	0.032491553	1600	0.00	160	0.00
Vanadium	30.8	0.00213	0.065604	0.001365	0.038	5.18581E-05	1	0.515	0.127487103	114	0.00	11.4	0.01
Zinc	51.1	0.00213	0.108843	0.029735	0.038	0.001129935	1	0.515	0.21353968	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 9. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0106		1	0.0771					
Arsenic	3.8	0.000724	0.0027512	0.0025	0.0106	0.0000265	1	0.0771	0.036027237	22.8	0.00	5.7	0.01
Cadmium	0.34	0.000724	0.00024616	0.00088	0.0106	9.33086E-06	1	0.0771	0.00331376	3.4	0.00	0.85	0.00
Chromium	16.7	0.000724	0.0120908	0.002039	0.0106	2.16149E-05	1	0.0771	0.157100064	5	0.03	1	0.16
Cobalt	11	0.000724	0.007964	0.000766	0.0106	8.11563E-06	1	0.0771	0.103399684	43.9	0.00	23.1	0.00
Copper	17.5	0.000724	0.01267	0.0044	0.0106	0.00004664	1	0.0771	0.164936965	33.2	0.00	26.9	0.01
Lead	15.2	0.000724	0.0110048	0.000696	0.0106	7.37457E-06	1	0.0771	0.142829761	15	0.01	1.5	0.10
Manganese	833	0.000724	0.603092	0.0944	0.0106	0.00100064	1	0.0771	7.835183398	9770	0.00	977	0.01
Molybdenum	0.73	0.000724	0.00052852	NM	0.0106	N/A	1	0.0771	0.006854994	35.5	0.00	3.55	0.00
Nickel	13.3	0.000724	0.0096292	0.0259	0.0106	0.000274543	1	0.0771	0.128453217	79	0.00	57.2	0.00
Selenium	0.085	0.000724	0.00006154	0.0005	0.0106	0.0000053	1	0.0771	0.000866926	0.8	0.00	0.4	0.00
Thallium	0.145625	0.000724	0.000105433	0.0015	0.0106	0.0000159	1	0.0771	0.001573703	1.2	0.00	0.12	0.01
Uranium	6.955	0.000724	0.00503542	0.0505	0.0106	0.0005353	1	0.0771	0.072253178	1600	0.00	160	0.00
Vanadium	30.8	0.000724	0.0222992	0.001365	0.0106	1.44657E-05	1	0.0771	0.289412006	114	0.00	11.4	0.03
Zinc	51.1	0.000724	0.0369964	0.029735	0.0106	0.000315192	1	0.0771	0.483937645	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 9. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.000111	0.0004218	0.0025	0.0061	0.00001525	1	0.0394	0.01109264	9.63	0.00	1.91	0.01
Cadmium	0.34	0.000111	0.00003774	0.00088	0.0061	5.36965E-06	1	0.0394	0.001094154	2.3	0.00	0.23	0.00
Chromium	16.7	0.000111	0.0018537	0.002039	0.0061	1.24388E-05	1	0.0394	0.047363928	56.8	0.00	5.68	0.01
Cobalt	11	0.000111	0.001221	0.000766	0.0061	4.67031E-06	1	0.0394	0.031108384	20	0.00	5	0.01
Copper	17.5	0.000111	0.0019425	0.0044	0.0061	0.00002684	1	0.0394	0.049983249	35.4	0.00	24.3	0.00
Lead	15.2	0.000111	0.0016872	0.000696	0.0061	4.24386E-06	1	0.0394	0.042930047	80	0.00	8	0.01
Manganese	833	0.000111	0.092463	0.0944	0.0061	0.00057584	1	0.0394	2.361391878	268	0.01	83	0.03
Molybdenum	0.73	0.000111	0.00008103	NM	0.0061	N/A	1	0.0394	0.002056599	1.9	0.00	0.19	0.01
Nickel	13.3	0.000111	0.0014763	0.0259	0.0061	0.000157992	1	0.0394	0.041479486	42.1	0.00	23.1	0.00
Selenium	0.085	0.000111	0.000009435	0.0005	0.0061	0.00000305	1	0.0394	0.000316878	0.25	0.00	0.025	0.01
Thallium	0.145625	0.000111	1.61644E-05	0.0015	0.0061	0.00000915	1	0.0394	0.000642497	0.74	0.00	0.074	0.01
Uranium	6.955	0.000111	0.000772005	0.0505	0.0061	0.00030805	1	0.0394	0.027412563	5	0.01	0.5	0.05
Vanadium	30.8	0.000111	0.0034188	0.001365	0.0061	8.32459E-06	1	0.0394	0.086982858	2.1	0.04	0.21	0.41
Zinc	51.1	0.000111	0.0056721	0.029735	0.0061	0.000181384	1	0.0394	0.148565592	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 9. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.083	0.3154	0.0025	3.61	0.009025	1	68.6	0.004729227	9.63	0.00	1.91	0.00
Cadmium	0.34	0.083	0.02822	0.00088	3.61	0.003177776	1	68.6	0.000457694	2.3	0.00	0.23	0.00
Chromium	16.7	0.083	1.3861	0.002039	3.61	0.007361306	1	68.6	0.020312847	56.8	0.00	5.68	0.00
Cobalt	11	0.083	0.913	0.000766	3.61	0.002763906	1	68.6	0.013349328	20	0.00	5	0.00
Copper	17.5	0.083	1.4525	0.0044	3.61	0.015884	1	68.6	0.021405015	35.4	0.00	24.3	0.00
Lead	15.2	0.083	1.2616	0.000696	3.61	0.002511529	1	68.6	0.018427282	80	0.00	8	0.00
Manganese	833	0.083	69.139	0.0944	3.61	0.340784	1	68.6	1.01282484	268	0.00	83	0.01
Molybdenum	0.73	0.083	0.06059	NM	3.61	N/A	1	68.6	0.000883236	1.9	0.00	0.19	0.00
Nickel	13.3	0.083	1.1039	0.0259	3.61	0.093500031	1	68.6	0.017454811	42.1	0.00	23.1	0.00
Selenium	0.085	0.083	0.007055	0.0005	3.61	0.001805	1	68.6	0.000129155	0.25	0.00	0.025	0.01
Thallium	0.145625	0.083	0.012086875	0.0015	3.61	0.005415	1	68.6	0.000255129	0.74	0.00	0.074	0.00
Uranium	6.955	0.083	0.577265	0.0505	3.61	0.182305	1	68.6	0.011072449	5	0.00	0.5	0.02
Vanadium	30.8	0.083	2.5564	0.001365	3.61	0.004926522	1	68.6	0.037337121	2.1	0.02	0.21	0.18
Zinc	51.1	0.083	4.2413	0.029735	3.61	0.107343838	1	68.6	0.06339131	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 9. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.0072	0.02736	0.0025	1.02	0.00255	1	13.3	0.002248872	9.63	0.00	1.91	0.00
Cadmium	0.34	0.0072	0.002448	0.00088	1.02	0.000897876	1	13.3	0.00025157	2.3	0.00	0.23	0.00
Chromium	16.7	0.0072	0.12024	0.002039	1.02	0.002079926	1	13.3	0.009196987	56.8	0.00	5.68	0.00
Cobalt	11	0.0072	0.0792	0.000766	1.02	0.000780938	1	13.3	0.006013604	20	0.00	5	0.00
Copper	17.5	0.0072	0.126	0.0044	1.02	0.004488	1	13.3	0.009811128	35.4	0.00	24.3	0.00
Lead	15.2	0.0072	0.10944	0.000696	1.02	0.000709629	1	13.3	0.008281927	80	0.00	8	0.00
Manganese	833	0.0072	5.9976	0.0944	1.02	0.096288	1	13.3	0.458187068	268	0.00	83	0.01
Molybdenum	0.73	0.0072	0.005256	NM	1.02	N/A	1	13.3	0.000395188	1.9	0.00	0.19	0.00
Nickel	13.3	0.0072	0.09576	0.0259	1.02	0.026418291	1	13.3	0.009186338	42.1	0.00	23.1	0.00
Selenium	0.085	0.0072	0.000612	0.0005	1.02	0.00051	1	13.3	8.43609E-05	0.25	0.00	0.025	0.00
Thallium	0.145625	0.0072	0.0010485	0.0015	1.02	0.00153	1	13.3	0.000193872	0.74	0.00	0.074	0.00
Uranium	6.955	0.0072	0.050076	0.0505	1.02	0.05151	1	13.3	0.007638045	5	0.00	0.5	0.02
Vanadium	30.8	0.0072	0.22176	0.001365	1.02	0.001391981	1	13.3	0.016778344	2.1	0.01	0.21	0.08
Zinc	51.1	0.0072	0.36792	0.029735	1.02	0.030329838	1	13.3	0.029943597	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 9. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.00529	0.020102	0.0025	0.73	0.001825	1	9.2	0.00238337	9.63	0.00	1.91	0.00
Cadmium	0.34	0.00529	0.0017986	0.00088	0.73	0.000642597	1	9.2	0.000265348	2.3	0.00	0.23	0.00
Chromium	16.7	0.00529	0.088343	0.002039	0.73	0.001488574	1	9.2	0.009764302	56.8	0.00	5.68	0.00
Cobalt	11	0.00529	0.05819	0.000766	0.73	0.000558906	1	9.2	0.006385751	20	0.00	5	0.00
Copper	17.5	0.00529	0.092575	0.0044	0.73	0.003212	1	9.2	0.01041163	35.4	0.00	24.3	0.00
Lead	15.2	0.00529	0.080408	0.000696	0.73	0.000507871	1	9.2	0.008795203	80	0.00	8	0.00
Manganese	833	0.00529	4.40657	0.0944	0.73	0.068912	1	9.2	0.486465435	268	0.00	83	0.01
Molybdenum	0.73	0.00529	0.0038617	NM	0.73	N/A	1	9.2	0.00041975	1.9	0.00	0.19	0.00
Nickel	13.3	0.00529	0.070357	0.0259	0.73	0.018907209	1	9.2	0.009702631	42.1	0.00	23.1	0.00
Selenium	0.085	0.00529	0.00044965	0.0005	0.73	0.000365	1	9.2	8.85489E-05	0.25	0.00	0.025	0.00
Thallium	0.145625	0.00529	0.000770356	0.0015	0.73	0.001095	1	9.2	0.000202756	0.74	0.00	0.074	0.00
Uranium	6.955	0.00529	0.03679195	0.0505	0.73	0.036865	1	9.2	0.00800619	5	0.00	0.5	0.02
Vanadium	30.8	0.00529	0.162932	0.001365	0.73	0.000996222	1	9.2	0.017818285	2.1	0.01	0.21	0.08
Zinc	51.1	0.00529	0.270319	0.029735	0.73	0.021706649	1	9.2	0.031741918	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 9. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231		1	0.00428					
Arsenic	3.8	0.000155	0.000589	0.0025	0.00231	0.000005775	1	0.00428	0.138966121	9.63	0.01	1.91	0.07
Cadmium	0.34	0.000155	0.0000527	0.00088	0.00231	2.03342E-06	1	0.00428	0.012788183	2.3	0.01	0.23	0.06
Chromium	16.7	0.000155	0.0025885	0.002039	0.00231	4.71042E-06	1	0.00428	0.605890285	56.8	0.01	5.68	0.11
Cobalt	11	0.000155	0.001705	0.000766	0.00231	1.76859E-06	1	0.00428	0.398777709	20	0.02	5	0.08
Copper	17.5	0.000155	0.0027125	0.0044	0.00231	0.000010164	1	0.00428	0.636136449	35.4	0.02	24.3	0.03
Lead	15.2	0.000155	0.002356	0.000696	0.00231	1.6071E-06	1	0.00428	0.55084278	80	0.01	8	0.07
Manganese	833	0.000155	0.129115	0.0944	0.00231	0.000218064	1	0.00428	30.21800561	268	0.11	83	0.36
Molybdenum	0.73	0.000155	0.00011315	NM	0.00231	N/A	1	0.00428	0.026436916	1.9	0.01	0.19	0.14
Nickel	13.3	0.000155	0.0020615	0.0259	0.00231	5.98297E-05	1	0.00428	0.495637771	42.1	0.01	23.1	0.02
Selenium	0.085	0.000155	0.000013175	0.0005	0.00231	0.000001155	1	0.00428	0.003348131	0.25	0.01	0.025	0.13
Thallium	0.145625	0.000155	2.25719E-05	0.0015	0.00231	0.000003465	1	0.00428	0.006083382	0.74	0.01	0.074	0.08
Uranium	6.955	0.000155	0.001078025	0.0505	0.00231	0.000116655	1	0.00428	0.279130841	5	0.06	0.5	0.56
Vanadium	30.8	0.000155	0.004774	0.001365	0.00231	3.15243E-06	1	0.00428	1.116157109	2.1	0.53	0.21	**5.32**
Zinc	51.1	0.000155	0.0079205	0.029735	0.00231	6.86882E-05	1	0.00428	1.866632748	225	0.01	22.5	0.08

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 9. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.000317	0.0012046	0.0025	0.00229	0.000005725	1	0.0185	0.065422973	9.63	0.01	1.91	0.03
Cadmium	0.34	0.000317	0.00010778	0.00088	0.00229	2.01582E-06	1	0.0185	0.005934909	2.3	0.00	0.23	0.03
Chromium	16.7	0.000317	0.0052939	0.002039	0.00229	4.66964E-06	1	0.0185	0.28640917	56.8	0.01	5.68	0.05
Cobalt	11	0.000317	0.003487	0.000766	0.00229	1.75328E-06	1	0.0185	0.188581258	20	0.01	5	0.04
Copper	17.5	0.000317	0.0055475	0.0044	0.00229	0.000010076	1	0.0185	0.300409514	35.4	0.01	24.3	0.01
Lead	15.2	0.000317	0.0048184	0.000696	0.00229	1.59319E-06	1	0.0185	0.260540172	80	0.00	8	0.03
Manganese	833	0.000317	0.264061	0.0944	0.00229	0.000216176	1	0.0185	14.28525276	268	0.05	83	0.17
Molybdenum	0.73	0.000317	0.00023141	NM	0.00229	N/A	1	0.0185	0.012508649	1.9	0.01	0.19	0.07
Nickel	13.3	0.000317	0.0042161	0.0259	0.00229	5.93117E-05	1	0.0185	0.231103333	42.1	0.01	23.1	0.01
Selenium	0.085	0.000317	0.000026945	0.0005	0.00229	0.000001145	1	0.0185	0.001518378	0.25	0.01	0.025	0.06
Thallium	0.145625	0.000317	4.61631E-05	0.0015	0.00229	0.000003435	1	0.0185	0.00268098	0.74	0.00	0.074	0.04
Uranium	6.955	0.000317	0.002204735	0.0505	0.00229	0.000115645	1	0.0185	0.125425946	5	0.03	0.5	0.25
Vanadium	30.8	0.000317	0.0097636	0.001365	0.00229	3.12513E-06	1	0.0185	0.527931088	2.1	0.25	0.21	**2.51**
Zinc	51.1	0.000317	0.0161987	0.029735	0.00229	6.80935E-05	1	0.0185	0.879286133	225	0.00	22.5	0.04

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PJ 10. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000142			0.00473		1	0.0231					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.0000142	5.41375E-05	0.0027419	0.00473	1.29691E-05	1	0.0231	0.002905046	22.8	0.00	5.7	0.00
Cadmium	0.189	0.0000142	2.68913E-06	0.0397118	0.00473	0.000187837	1	0.0231	0.008247869	3.4	0.00	0.85	0.01
Chromium	9.900	0.0000142	0.00014058	0.0072406	0.00473	3.42482E-05	1	0.0231	0.007568318	5	0.00	1	0.01
Cobalt	6.519	0.0000142	9.25663E-05	0.0515667	0.00473	0.00024391	1	0.0231	0.014566086	43.9	0.00	23.1	0.00
Copper	12.500	0.0000142	0.0001775	0.0508294	0.00473	0.000240423	1	0.0231	0.01809191	33.2	0.00	26.9	0.00
Lead	13.431	0.0000142	0.000190724	0.0001	0.00473	0.000000473	1	0.0231	0.008276916	15	0.00	1.5	0.01
Manganese	543.625	0.0000142	0.007719475	71.524	0.00473	0.33830852	1	0.0231	14.97956688	9770	0.00	977	0.02
Molybdenum	0.878	0.0000142	1.24694E-05	NM	0.00473	N/A	1	0.0231	0.0005398	35.5	0.00	3.55	0.00
Nickel	8.900	0.0000142	0.00012638	1.103	0.00473	0.00521719	1	0.0231	0.231323377	79	0.00	57.2	0.00
Selenium	0.192	0.0000142	2.72463E-06	0.0005	0.00473	0.000002365	1	0.0231	0.00022033	0.8	0.00	0.4	0.00
Thallium	0.129	0.0000142	1.82825E-06	0.00005	0.00473	2.365E-07	1	0.0231	8.93831E-05	1.2	0.00	0.12	0.00
Uranium	6.162	0.0000142	8.74986E-05	0.366	0.00473	0.00173118	1	0.0231	0.078730676	1600	0.00	160	0.00
Vanadium	21.900	0.0000142	0.00031098	0.0020033	0.00473	9.47577E-06	1	0.0231	0.013872544	114	0.00	11.4	0.00
Zinc	42.138	0.0000142	0.000598353	1.16	0.00473	0.0054868	1	0.0231	0.263426515	223.5	0.00	10.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 10. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations, Two Food Items
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.000256	0.000976	0.0027419	0.0045	1.23384E-05	1	0.0218	0.045336626	22.8	0.00	5.7	0.01
Cadmium	0.189	0.000256	0.00004848	0.0397118	0.0045	0.000178703	1	0.0218	0.010421236	3.4	0.00	0.85	0.01
Chromium	9.900	0.000256	0.0025344	0.0072406	0.0045	3.25828E-05	1	0.0218	0.117751505	5	0.02	1	0.12
Cobalt	6.519	0.000256	0.0016688	0.0515667	0.0045	0.00023205	1	0.0218	0.087194954	43.9	0.00	23.1	0.00
Copper	12.500	0.000256	0.0032	0.0508294	0.0045	0.000228732	1	0.0218	0.157281301	33.2	0.00	26.9	0.01
Lead	13.431	0.000256	0.0034384	0.0001	0.0045	0.00000045	1	0.0218	0.157745413	15	0.01	1.5	0.11
Manganese	543.625	0.000256	0.139168	71.524	0.0045	0.321858	1	0.0218	21.14798165	9770	0.00	977	0.02
Molybdenum	0.878	0.000256	0.0002248	NM	0.0045	N/A	1	0.0218	0.010311927	35.5	0.00	3.55	0.00
Nickel	8.900	0.000256	0.0022784	1.103	0.0045	0.0049635	1	0.0218	0.332197248	79	0.00	57.2	0.01
Selenium	0.192	0.000256	0.00004912	0.0005	0.0045	0.00000225	1	0.0218	0.002356422	0.8	0.00	0.4	0.01
Thallium	0.129	0.000256	0.00003296	0.00005	0.0045	0.000000225	1	0.0218	0.001522248	1.2	0.00	0.12	0.01
Uranium	6.162	0.000256	0.00157744	0.366	0.0045	0.001647	1	0.0218	0.147910092	1,600	0.00	160	0.00
Vanadium	21.900	0.000256	0.0056064	0.0020033	0.0045	9.015E-06	1	0.0218	0.257587844	114	0.00	11.4	0.02
Zinc	42.138	0.000256	0.0107872	1.16	0.0045	0.00522	1	0.0218	0.734275229	223.5	0.00	10.5	0.07

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 10. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.000256	0.000976	0.002742	0.0045	1.23384E-05	1	0.0218	0.045336626	22.8	0.00	5.7	0.01
Cadmium	0.189	0.000256	0.00004848	0.039712	0.0045	0.000178703	1	0.0218	0.010421236	3.4	0.00	0.85	0.01
Chromium	9.900	0.000256	0.0025344	0.007241	0.0045	3.25828E-05	1	0.0218	0.117751505	5	0.02	1	0.12
Cobalt	6.519	0.000256	0.0016688	0.051567	0.0045	0.00023205	1	0.0218	0.087194954	43.9	0.00	23.1	0.00
Copper	12.500	0.000256	0.0032	0.050829	0.0045	0.000228732	1	0.0218	0.157281301	33.2	0.00	26.9	0.01
Lead	13.431	0.000256	0.0034384	0.0001	0.0045	0.00000045	1	0.0218	0.157745413	15	0.01	1.5	0.11
Manganese	543.625	0.000256	0.139168	71.524	0.0045	0.321858	1	0.0218	21.14798165	9770	0.00	977	0.02
Molybdenum	0.878	0.000256	0.0002248	NM	0.0045	N/A	1	0.0218	0.010311927	35.5	0.00	3.55	0.00
Nickel	8.900	0.000256	0.0022784	1.103	0.0045	0.0049635	1	0.0218	0.332197248	79	0.00	57.2	0.01
Selenium	0.192	0.000256	0.00004912	0.0005	0.0045	0.00000225	1	0.0218	0.002356422	0.8	0.00	0.4	0.01
Thallium	0.129	0.000256	0.00003296	0.00005	0.0045	0.000000225	1	0.0218	0.001522248	1.2	0.00	0.12	0.01
Uranium	6.162	0.000256	0.00157744	0.366	0.0045	0.001647	1	0.0218	0.147910092	1600	0.00	160	0.00
Vanadium	21.900	0.000256	0.0056064	0.002003	0.0045	9.015E-06	1	0.0218	0.257587844	114	0.00	11.4	0.02
Zinc	42.138	0.000256	0.0107872	1.16	0.0045	0.00522	1	0.0218	0.734275229	223.5	0.00	10.5	0.07

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 10. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00038			0.014		1	0.117					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.00038	0.00144875	0.002742	0.014	3.83863E-05	1	0.117	0.012710566	22.8	0.00	5.7	0.00
Cadmium	0.189	0.00038	7.19625E-05	0.039712	0.014	0.000555965	1	0.117	0.005366899	3.4	0.00	0.85	0.01
Chromium	9.900	0.00038	0.003762	0.007241	0.014	0.000101369	1	0.117	0.033020246	5	0.01	1	0.03
Cobalt	6.519	0.00038	0.002477125	0.051567	0.014	0.000721933	1	0.117	0.027342379	43.9	0.00	23.1	0.00
Copper	12.500	0.00038	0.00475	0.050829	0.014	0.000711612	1	0.117	0.046680442	33.2	0.00	26.9	0.00
Lead	13.431	0.00038	0.005103875	0.0001	0.014	0.0000014	1	0.117	0.043634829	15	0.00	1.5	0.03
Manganese	543.625	0.00038	0.2065775	71.524	0.014	1.001336	1	0.117	10.32404701	9770	0.00	977	0.01
Molybdenum	0.878	0.00038	0.000333688	NM	0.014	N/A	1	0.117	0.00285203	35.5	0.00	3.55	0.00
Nickel	8.900	0.00038	0.003382	1.103	0.014	0.015442	1	0.117	0.160888889	79	0.00	57.2	0.00
Selenium	0.192	0.00038	7.29125E-05	0.0005	0.014	0.000007	1	0.117	0.000683013	0.8	0.00	0.4	0.00
Thallium	0.129	0.00038	0.000048925	0.00005	0.014	0.0000007	1	0.117	0.000424145	1.2	0.00	0.12	0.00
Uranium	6.162	0.00038	0.002341513	0.366	0.014	0.005124	1	0.117	0.063807799	1600	0.00	160	0.00
Vanadium	21.900	0.00038	0.008322	0.002003	0.014	2.80467E-05	1	0.117	0.07136792	114	0.00	11.4	0.01
Zinc	42.138	0.00038	0.01601225	1.16	0.014	0.01624	1	0.117	0.275660256	223.5	0.00	10.5	0.03

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 10. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.00151	0.005756875	0.002742	0.075	0.000205641	1	1.436	0.00415217	22.8	0.00	5.7	0.00
Cadmium	0.189	0.00151	0.000285956	0.039712	0.075	0.002978382	1	1.436	0.002273216	3.4	0.00	0.85	0.00
Chromium	9.900	0.00151	0.014949	0.007241	0.075	0.000543047	1	1.436	0.010788333	5	0.00	1	0.01
Cobalt	6.519	0.00151	0.009843313	0.051567	0.075	0.0038675	1	1.436	0.00954792	43.9	0.00	23.1	0.00
Copper	12.500	0.00151	0.018875	0.050829	0.075	0.003812206	1	1.436	0.01579889	33.2	0.00	26.9	0.00
Lead	13.431	0.00151	0.020281188	0.0001	0.075	0.0000075	1	1.436	0.014128612	15	0.00	1.5	0.01
Manganese	543.625	0.00151	0.82087375	71.524	0.075	5.3643	1	1.436	4.30722406	9770	0.00	977	0.00
Molybdenum	0.878	0.00151	0.001325969	NM	0.075	N/A	1	1.436	0.000923377	35.5	0.00	3.55	0.00
Nickel	8.900	0.00151	0.013439	1.103	0.075	0.082725	1	1.436	0.066966574	79	0.00	57.2	0.00
Selenium	0.192	0.00151	0.000289731	0.0005	0.075	0.0000375	1	1.436	0.000227877	0.8	0.00	0.4	0.00
Thallium	0.129	0.00151	0.000194413	0.00005	0.075	0.00000375	1	1.436	0.000137996	1.2	0.00	0.12	0.00
Uranium	6.162	0.00151	0.009304431	0.366	0.075	0.02745	1	1.436	0.025595008	1600	0.00	160	0.00
Vanadium	21.900	0.00151	0.033069	0.002003	0.075	0.00015025	1	1.436	0.023133182	114	0.00	11.4	0.00
Zinc	42.138	0.00151	0.063627625	1.16	0.075	0.087	1	1.436	0.104893889	223.5	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 10. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.00213	0.008120625	0.002742	0.038	0.000104191	1	0.515	0.015970517	22.8	0.00	5.7	0.00
Cadmium	0.189	0.00213	0.000403369	0.039712	0.038	0.001509047	1	0.515	0.003713429	3.4	0.00	0.85	0.00
Chromium	9.900	0.00213	0.021087	0.007241	0.038	0.000275144	1	0.515	0.041479891	5	0.01	1	0.04
Cobalt	6.519	0.00213	0.013884938	0.051567	0.038	0.001959533	1	0.515	0.030765963	43.9	0.00	23.1	0.00
Copper	12.500	0.00213	0.026625	0.050829	0.038	0.001931518	1	0.515	0.055449549	33.2	0.00	26.9	0.00
Lead	13.431	0.00213	0.028608563	0.0001	0.038	0.0000038	1	0.515	0.055557985	15	0.00	1.5	0.04
Manganese	543.625	0.00213	1.15792125	71.524	0.038	2.717912	1	0.515	7.525889806	9770	0.00	977	0.01
Molybdenum	0.878	0.00213	0.001870406	NM	0.038	N/A	1	0.515	0.003631857	35.5	0.00	3.55	0.00
Nickel	8.900	0.00213	0.018957	1.103	0.038	0.041914	1	0.515	0.118196117	79	0.00	57.2	0.00
Selenium	0.192	0.00213	0.000408694	0.0005	0.038	0.000019	1	0.515	0.000830473	0.8	0.00	0.4	0.00
Thallium	0.129	0.00213	0.000274238	0.00005	0.038	0.0000019	1	0.515	0.000536189	1.2	0.00	0.12	0.00
Uranium	6.162	0.00213	0.013124794	0.366	0.038	0.013908	1	0.515	0.052490862	1600	0.00	160	0.00
Vanadium	21.900	0.00213	0.046647	0.002003	0.038	7.61267E-05	1	0.515	0.090724518	114	0.00	11.4	0.01
Zinc	42.138	0.00213	0.089752875	1.16	0.038	0.04408	1	0.515	0.25986966	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 10. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0106		1	0.0771					
Arsenic	3.813	0.000724	0.00276025	0.002742	0.0106	2.90639E-05	1	0.0771	0.036177871	22.8	0.00	5.7	0.01
Cadmium	0.189	0.000724	0.000137108	0.039712	0.0106	0.000420945	1	0.0771	0.007238031	3.4	0.00	0.85	0.01
Chromium	9.900	0.000724	0.0071676	0.007241	0.0106	7.67506E-05	1	0.0771	0.093960449	5	0.02	1	0.09
Cobalt	6.519	0.000724	0.004719575	0.051567	0.0106	0.000546607	1	0.0771	0.068303264	43.9	0.00	23.1	0.00
Copper	12.500	0.000724	0.00905	0.050829	0.0106	0.000538792	1	0.0771	0.124368246	33.2	0.00	26.9	0.00
Lead	13.431	0.000724	0.009724225	0.0001	0.0106	0.00000106	1	0.0771	0.126138586	15	0.01	1.5	0.08
Manganese	543.625	0.000724	0.3935845	71.524	0.0106	0.7581544	1	0.0771	14.93824773	9770	0.00	977	0.02
Molybdenum	0.878	0.000724	0.000635763	NM	0.0106	N/A	1	0.0771	0.008245947	35.5	0.00	3.55	0.00
Nickel	8.900	0.000724	0.0064436	1.103	0.0106	0.0116918	1	0.0771	0.235219196	79	0.00	57.2	0.00
Selenium	0.192	0.000724	0.000138918	0.0005	0.0106	0.0000053	1	0.0771	0.001870525	0.8	0.00	0.4	0.00
Thallium	0.129	0.000724	0.000093215	0.00005	0.0106	0.00000053	1	0.0771	0.001215888	1.2	0.00	0.12	0.01
Uranium	6.162	0.000724	0.004461198	0.366	0.0106	0.0038796	1	0.0771	0.10818155	1600	0.00	160	0.00
Vanadium	21.900	0.000724	0.0158556	0.002003	0.0106	2.12353E-05	1	0.0771	0.205925231	114	0.00	11.4	0.02
Zinc	42.138	0.000724	0.03050755	1.16	0.0106	0.012296	1	0.0771	0.555169261	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 10. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.000111	0.000423188	0.002742	0.0061	1.67254E-05	1	0.0394	0.011165303	9.63	0.00	1.91	0.01
Cadmium	0.189	0.000111	2.10206E-05	0.039712	0.0061	0.000242242	1	0.0394	0.006681787	2.3	0.00	0.23	0.03
Chromium	9.900	0.000111	0.0010989	0.007241	0.0061	4.41678E-05	1	0.0394	0.029011873	56.8	0.00	5.68	0.01
Cobalt	6.519	0.000111	0.000723581	0.051567	0.0061	0.000314557	1	0.0394	0.026348678	20	0.00	5	0.01
Copper	12.500	0.000111	0.0013875	0.050829	0.0061	0.000310059	1	0.0394	0.043085264	35.4	0.00	24.3	0.00
Lead	13.431	0.000111	0.001490869	0.0001	0.0061	0.00000061	1	0.0394	0.037854791	80	0.00	8	0.00
Manganese	543.625	0.000111	0.060342375	71.524	0.0061	0.4362964	1	0.0394	12.60504505	268	0.05	83	0.15
Molybdenum	0.878	0.000111	9.74719E-05	NM	0.0061	N/A	1	0.0394	0.002473905	1.9	0.00	0.19	0.01
Nickel	8.900	0.000111	0.0009879	1.103	0.0061	0.0067283	1	0.0394	0.19584264	42.1	0.00	23.1	0.01
Selenium	0.192	0.000111	2.12981E-05	0.0005	0.0061	0.00000305	1	0.0394	0.000617973	0.25	0.00	0.025	0.02
Thallium	0.129	0.000111	1.42913E-05	0.00005	0.0061	0.000000305	1	0.0394	0.000370463	0.74	0.00	0.074	0.01
Uranium	6.162	0.000111	0.000683968	0.366	0.0061	0.0022326	1	0.0394	0.074024572	5	0.01	0.5	0.15
Vanadium	21.900	0.000111	0.0024309	0.002003	0.0061	1.22203E-05	1	0.0394	0.06200813	2.1	0.03	0.21	0.30
Zinc	42.138	0.000111	0.004677263	1.16	0.0061	0.007076	1	0.0394	0.298306155	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 10. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.083	0.3164375	0.002742	3.61	0.009898169	1	68.6	0.00475708	9.63	0.00	1.91	0.00
Cadmium	0.189	0.083	0.015718125	0.039712	3.61	0.143359471	1	68.6	0.002318915	2.3	0.00	0.23	0.01
Chromium	9.900	0.083	0.8217	0.007241	3.61	0.026138656	1	68.6	0.012359164	56.8	0.00	5.68	0.00
Cobalt	6.519	0.083	0.54105625	0.051567	3.61	0.186155667	1	68.6	0.010600757	20	0.00	5	0.00
Copper	12.500	0.083	1.0375	0.050829	3.61	0.183494176	1	68.6	0.017798749	35.4	0.00	24.3	0.00
Lead	13.431	0.083	1.11479375	0.0001	3.61	0.000361	1	68.6	0.0162559	80	0.00	8	0.00
Manganese	543.625	0.083	45.120875	71.524	3.61	258.20164	1	68.6	4.421611006	268	0.02	83	0.05
Molybdenum	0.878	0.083	0.072884375	NM	3.61	N/A	1	68.6	0.001062454	1.9	0.00	0.19	0.01
Nickel	8.900	0.083	0.7387	1.103	3.61	3.98183	1	68.6	0.068812391	42.1	0.00	23.1	0.00
Selenium	0.192	0.083	0.015925625	0.0005	3.61	0.001805	1	68.6	0.000258464	0.25	0.00	0.025	0.01
Thallium	0.129	0.083	0.01068625	0.00005	3.61	0.0001805	1	68.6	0.000158407	0.74	0.00	0.074	0.00
Uranium	6.162	0.083	0.511435625	0.366	3.61	1.32126	1	68.6	0.02671568	5	0.01	0.5	0.05
Vanadium	21.900	0.083	1.8177	0.002003	3.61	0.007232033	1	68.6	0.026602508	2.1	0.01	0.21	0.13
Zinc	42.138	0.083	3.4974125	1.16	3.61	4.1876	1	68.6	0.112026421	225	0.00	22.5	0.00

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PD 10. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.0072	0.02745	0.002742	1.02	0.002796713	1	13.3	0.002274189	9.63	0.00	1.91	0.00
Cadmium	0.189	0.0072	0.0013635	0.039712	1.02	0.040506	1	13.3	0.003148083	2.3	0.00	0.23	0.01
Chromium	9.900	0.0072	0.07128	0.007241	1.02	0.007385438	1	13.3	0.005914695	56.8	0.00	5.68	0.00
Cobalt	6.519	0.0072	0.046935	0.051567	1.02	0.052598	1	13.3	0.007483684	20	0.00	5	0.00
Copper	12.500	0.0072	0.09	0.050829	1.02	0.051846	1	13.3	0.010665113	35.4	0.00	24.3	0.00
Lead	13.431	0.0072	0.096705	0.0001	1.02	0.000102	1	13.3	0.007278722	80	0.00	8	0.00
Manganese	543.625	0.0072	3.9141	71.524	1.02	72.95448	1	13.3	5.779592481	268	0.02	83	0.07
Molybdenum	0.878	0.0072	0.0063225	NM	1.02	N/A	1	13.3	0.000475376	1.9	0.00	0.19	0.00
Nickel	8.900	0.0072	0.06408	1.103	1.02	1.12506	1	13.3	0.089409023	42.1	0.00	23.1	0.00
Selenium	0.192	0.0072	0.0013815	0.0005	1.02	0.00051	1	13.3	0.000142218	0.25	0.00	0.025	0.01
Thallium	0.129	0.0072	0.000927	0.00005	1.02	0.000051	1	13.3	7.35338E-05	0.74	0.00	0.074	0.00
Uranium	6.162	0.0072	0.0443655	0.366	1.02	0.37332	1	13.3	0.031404925	5	0.01	0.5	0.06
Vanadium	21.900	0.0072	0.15768	0.002003	1.02	0.0020434	1	13.3	0.012009278	2.1	0.01	0.21	0.06
Zinc	42.138	0.0072	0.30339	1.16	1.02	1.1832	1	13.3	0.111773684	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 10. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.00529	0.020168125	0.002742	0.73	0.002001569	1	9.2	0.002409749	9.63	0.00	1.91	0.00
Cadmium	0.189	0.00529	0.001001794	0.039712	0.73	0.028989588	1	9.2	0.003259933	2.3	0.00	0.23	0.01
Chromium	9.900	0.00529	0.052371	0.007241	0.73	0.005285656	1	9.2	0.006267028	56.8	0.00	5.68	0.00
Cobalt	6.519	0.00529	0.034484188	0.051567	0.73	0.037643667	1	9.2	0.007839984	20	0.00	5	0.00
Copper	12.500	0.00529	0.066125	0.050829	0.73	0.037105471	1	9.2	0.011220703	35.4	0.00	24.3	0.00
Lead	13.431	0.00529	0.071051313	0.0001	0.73	0.000073	1	9.2	0.007730904	80	0.00	8	0.00
Manganese	543.625	0.00529	2.87577625	71.524	0.73	52.21252	1	9.2	5.987858288	268	0.02	83	0.07
Molybdenum	0.878	0.00529	0.004645281	NM	0.73	N/A	1	9.2	0.000504922	1.9	0.00	0.19	0.00
Nickel	8.900	0.00529	0.047081	1.103	0.73	0.80519	1	9.2	0.092638152	42.1	0.00	23.1	0.00
Selenium	0.192	0.00529	0.001015019	0.0005	0.73	0.000365	1	9.2	0.000150002	0.25	0.00	0.025	0.01
Thallium	0.129	0.00529	0.000681088	0.00005	0.73	0.0000365	1	9.2	7.79986E-05	0.74	0.00	0.074	0.00
Uranium	6.162	0.00529	0.032596319	0.366	0.73	0.26718	1	9.2	0.032584382	5	0.01	0.5	0.07
Vanadium	21.900	0.00529	0.115851	0.002003	0.73	0.001462433	1	9.2	0.01275146	2.1	0.01	0.21	0.06
Zinc	42.138	0.00529	0.222907375	1.16	0.73	0.8468	1	9.2	0.116272541	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 10. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000155			0.00231		1	0.00428					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.000155	0.000590938	0.002742	0.00231	6.33373E-06	1	0.00428	0.139549353	9.63	0.01	1.91	0.07
Cadmium	0.189	0.000155	2.93531E-05	0.039712	0.00231	9.17342E-05	1	0.00428	0.028291426	2.3	0.01	0.23	0.12
Chromium	9.900	0.000155	0.0015345	0.007241	0.00231	1.67258E-05	1	0.00428	0.362435945	56.8	0.01	5.68	0.06
Cobalt	6.519	0.000155	0.001010406	0.051567	0.00231	0.000119119	1	0.00428	0.263907769	20	0.01	5	0.05
Copper	12.500	0.000155	0.0019375	0.050829	0.00231	0.000117416	1	0.00428	0.480120547	35.4	0.01	24.3	0.02
Lead	13.431	0.000155	0.002081844	0.0001	0.00231	0.000000231	1	0.00428	0.486466063	80	0.01	8	0.06
Manganese	543.625	0.000155	0.084261875	71.524	0.00231	0.16522044	1	0.00428	58.29026051	268	0.22	83	0.70
Molybdenum	0.878	0.000155	0.000136109	NM	0.00231	N/A	1	0.00428	0.031801256	1.9	0.02	0.19	0.17
Nickel	8.900	0.000155	0.0013795	1.103	0.00231	0.00254793	1	0.00428	0.917623832	42.1	0.02	23.1	0.04
Selenium	0.192	0.000155	2.97406E-05	0.0005	0.00231	0.000001155	1	0.00428	0.007218604	0.25	0.03	0.025	0.29
Thallium	0.129	0.000155	1.99563E-05	0.00005	0.00231	1.155E-07	1	0.00428	0.004689661	0.74	0.01	0.074	0.06
Uranium	6.162	0.000155	0.000955091	0.366	0.00231	0.00084546	1	0.00428	0.420689398	5	0.08	0.5	0.84
Vanadium	21.900	0.000155	0.0033945	0.002003	0.00231	4.6277E-06	1	0.00428	0.794188715	2.1	0.38	0.21	**3.78**
Zinc	42.138	0.000155	0.006531313	1.16	0.00231	0.0026796	1	0.00428	2.15208236	225	0.01	22.5	0.10

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 10. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 2: Representative Life History Parameters, Central Tendency Metals Concentrations
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.813	0.000317	0.001208563	0.002742	0.00229	6.27889E-06	1	0.0185	0.065667102	9.63	0.01	1.91	0.03
Cadmium	0.189	0.000317	6.00319E-05	0.039712	0.00229	9.09399E-05	1	0.0185	0.008160639	2.3	0.00	0.23	0.04
Chromium	9.900	0.000317	0.0031383	0.007241	0.00229	1.6581E-05	1	0.0185	0.17053411	56.8	0.00	5.68	0.03
Cobalt	6.519	0.000317	0.002066444	0.051567	0.00229	0.000118088	1	0.0185	0.118082779	20	0.01	5	0.02
Copper	12.500	0.000317	0.0039625	0.050829	0.00229	0.000116399	1	0.0185	0.220481046	35.4	0.01	24.3	0.01
Lead	13.431	0.000317	0.004257706	0.0001	0.00229	0.000000229	1	0.0185	0.230158662	80	0.00	8	0.03
Manganese	543.625	0.000317	0.172329125	71.524	0.00229	0.16378996	1	0.0185	18.16859919	268	0.07	83	0.22
Molybdenum	0.878	0.000317	0.000278366	NM	0.00229	N/A	1	0.0185	0.015046791	1.9	0.01	0.19	0.08
Nickel	8.900	0.000317	0.0028213	1.103	0.00229	0.00252587	1	0.0185	0.289036216	42.1	0.01	23.1	0.01
Selenium	0.192	0.000317	6.08244E-05	0.0005	0.00229	0.000001145	1	0.0185	0.003349696	0.25	0.01	0.025	0.13
Thallium	0.129	0.000317	4.08138E-05	0.00005	0.00229	1.145E-07	1	0.0185	0.002212338	0.74	0.00	0.074	0.03
Uranium	6.162	0.000317	0.001953314	0.366	0.00229	0.00083814	1	0.0185	0.150889426	5	0.03	0.5	0.30
Vanadium	21.900	0.000317	0.0069423	0.002003	0.00229	4.58763E-06	1	0.0185	0.37550744	2.1	0.18	0.21	**1.79**
Zinc	42.138	0.000317	0.013357588	1.16	0.00229	0.0026564	1	0.0185	0.865620946	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 12. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000142			0.00473		1	0.0231					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.0000142	0.00016614	0.0043525	0.00473	2.05873E-05	1	0.0231	0.008083434	22.8	0.00	5.7	0.00
Cadmium	0.303	0.0000142	4.3026E-06	0.0029294	0.00473	1.38561E-05	1	0.0231	0.000786092	3.4	0.00	0.85	0.00
Chromium	10.44	0.0000142	0.000148248	0.0019875	0.00473	9.40088E-06	1	0.0231	0.006824627	5	0.00	1	0.01
Cobalt	6.38	0.0000142	0.000090596	0.0044	0.00473	0.000020812	1	0.0231	0.004822857	43.9	0.00	23.1	0.00
Copper	21.14	0.0000142	0.000300188	0.0471624	0.00473	0.000223078	1	0.0231	0.022652205	33.2	0.00	26.9	0.00
Lead	14.22	0.0000142	0.000201924	0.0005344	0.00473	2.52759E-06	1	0.0231	0.008850718	15	0.00	1.5	0.01
Manganese	748.8	0.0000142	0.01063296	8.719	0.00473	0.04124087	1	0.0231	2.245620346	9770	0.00	977	0.00
Molybdenum	2.654	0.0000142	3.76868E-05	NM	0.00473	N/A	1	0.0231	0.001631463	35.5	0.00	3.55	0.00
Nickel	8.92	0.0000142	0.000126664	0.2427688	0.00473	0.001148296	1	0.0231	0.055193082	79	0.00	57.2	0.00
Selenium	0.085	0.0000142	0.000001207	0.001	0.00473	0.00000473	1	0.0231	0.000257013	0.8	0.00	0.4	0.00
Thallium	0.24	0.0000142	0.000003408	0.0003	0.00473	0.000001419	1	0.0231	0.000208961	1.2	0.00	0.12	0.00
Uranium	93.675	0.0000142	0.001330185	0.1	0.00473	0.000473	1	0.0231	0.078059957	1600	0.00	160	0.00
Vanadium	23.26	0.0000142	0.000330292	0.00025	0.00473	1.1825E-06	1	0.0231	0.014349545	114	0.00	11.4	0.00
Zinc	55.42	0.0000142	0.000786964	0.2980588	0.00473	0.001409818	1	0.0231	0.095098798	223.5	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 12. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000256	0.0029952	0.0043525	0.0045	1.95863E-05	1	0.0218	0.138292947	22.8	0.01	5.7	0.02
Cadmium	0.303	0.000256	0.000077568	0.0029294	0.0045	1.31824E-05	1	0.0218	0.00416286	3.4	0.00	0.85	0.00
Chromium	10.44	0.000256	0.00267264	0.0019875	0.0045	8.94375E-06	1	0.0218	0.123008429	5	0.02	1	0.12
Cobalt	6.38	0.000256	0.00163328	0.0044	0.0045	0.0000198	1	0.0218	0.075829358	43.9	0.00	23.1	0.00
Copper	21.14	0.000256	0.00541184	0.0471624	0.0045	0.000212231	1	0.0218	0.257984889	33.2	0.01	26.9	0.01
Lead	14.22	0.000256	0.00364032	0.0005344	0.0045	2.40469E-06	1	0.0218	0.167097463	15	0.01	1.5	0.11
Manganese	748.8	0.000256	0.1916928	8.719	0.0045	0.0392355	1	0.0218	10.59304128	9770	0.00	977	0.01
Molybdenum	2.654	0.000256	0.000679424	NM	0.0045	N/A	1	0.0218	0.031166239	35.5	0.00	3.55	0.01
Nickel	8.92	0.000256	0.00228352	0.2427688	0.0045	0.001092459	1	0.0218	0.154861439	79	0.00	57.2	0.00
Selenium	0.085	0.000256	0.00002176	0.001	0.0045	0.0000045	1	0.0218	0.001204587	0.8	0.00	0.4	0.00
Thallium	0.24	0.000256	0.00006144	0.0003	0.0045	0.00000135	1	0.0218	0.002880275	1.2	0.00	0.12	0.02
Uranium	93.675	0.000256	0.0239808	0.1	0.0045	0.00045	1	0.0218	1.120678899	1,600	0.00	160	0.01
Vanadium	23.26	0.000256	0.00595456	0.00025	0.0045	0.000001125	1	0.0218	0.27319656	114	0.00	11.4	0.02
Zinc	55.42	0.000256	0.01418752	0.2980588	0.0045	0.001341265	1	0.0218	0.712329574	223.5	0.00	10.5	0.07

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 12. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000256	0.0029952	0.004353	0.0045	1.95863E-05	1	0.0218	0.138292947	22.8	0.01	5.7	0.02
Cadmium	0.303	0.000256	0.000077568	0.002929	0.0045	1.31824E-05	1	0.0218	0.00416286	3.4	0.00	0.85	0.00
Chromium	10.44	0.000256	0.00267264	0.001988	0.0045	8.94375E-06	1	0.0218	0.123008429	5	0.02	1	0.12
Cobalt	6.38	0.000256	0.00163328	0.0044	0.0045	0.0000198	1	0.0218	0.075829358	43.9	0.00	23.1	0.00
Copper	21.14	0.000256	0.00541184	0.047162	0.0045	0.000212231	1	0.0218	0.257984889	33.2	0.01	26.9	0.01
Lead	14.22	0.000256	0.00364032	0.000534	0.0045	2.40469E-06	1	0.0218	0.167097463	15	0.01	1.5	0.11
Manganese	748.8	0.000256	0.1916928	8.719	0.0045	0.0392355	1	0.0218	10.59304128	9770	0.00	977	0.01
Molybdenum	2.654	0.000256	0.000679424	NM	0.0045	N/A	1	0.0218	0.031166239	35.5	0.00	3.55	0.01
Nickel	8.92	0.000256	0.00228352	0.242769	0.0045	0.001092459	1	0.0218	0.154861439	79	0.00	57.2	0.00
Selenium	0.085	0.000256	0.00002176	0.001	0.0045	0.0000045	1	0.0218	0.001204587	0.8	0.00	0.4	0.00
Thallium	0.24	0.000256	0.00006144	0.0003	0.0045	0.00000135	1	0.0218	0.002880275	1.2	0.00	0.12	0.02
Uranium	93.675	0.000256	0.0239808	0.1	0.0045	0.00045	1	0.0218	1.120678899	1600	0.00	160	0.01
Vanadium	23.26	0.000256	0.00595456	0.00025	0.0045	0.000001125	1	0.0218	0.27319656	114	0.00	11.4	0.02
Zinc	55.42	0.000256	0.01418752	0.298059	0.0045	0.001341265	1	0.0218	0.712329574	223.5	0.00	10.5	0.07

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 12. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00038			0.014		1	0.117					
COPC	Conc. in Soil mg/kg d.w.	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00038	0.004446	0.004353	0.014	0.000060935	1	0.117	0.038520812	22.8	0.00	5.7	0.01
Cadmium	0.303	0.00038	0.00011514	0.002929	0.014	4.10118E-05	1	0.117	0.00133463	3.4	0.00	0.85	0.00
Chromium	10.44	0.00038	0.0039672	0.001988	0.014	0.000027825	1	0.117	0.034145513	5	0.01	1	0.03
Cobalt	6.38	0.00038	0.0024244	0.0044	0.014	0.0000616	1	0.117	0.021247863	43.9	0.00	23.1	0.00
Copper	21.14	0.00038	0.0080332	0.047162	0.014	0.000660273	1	0.117	0.074303188	33.2	0.00	26.9	0.00
Lead	14.22	0.00038	0.0054036	0.000534	0.014	7.48125E-06	1	0.117	0.046248558	15	0.00	1.5	0.03
Manganese	748.8	0.00038	0.284544	8.719	0.014	0.122066	1	0.117	3.475299145	9770	0.00	977	0.00
Molybdenum	2.654	0.00038	0.00100852	NM	0.014	N/A	1	0.117	0.008619829	35.5	0.00	3.55	0.00
Nickel	8.92	0.00038	0.0033896	0.242769	0.014	0.003398763	1	0.117	0.058020192	79	0.00	57.2	0.00
Selenium	0.085	0.00038	0.0000323	0.001	0.014	0.000014	1	0.117	0.000395726	0.8	0.00	0.4	0.00
Thallium	0.24	0.00038	0.0000912	0.0003	0.014	0.0000042	1	0.117	0.000815385	1.2	0.00	0.12	0.01
Uranium	93.675	0.00038	0.0355965	0.1	0.014	0.0014	1	0.117	0.316209402	1600	0.00	160	0.00
Vanadium	23.26	0.00038	0.0088388	0.00025	0.014	0.0000035	1	0.117	0.075575214	114	0.00	11.4	0.01
Zinc	55.42	0.00038	0.0210596	0.298059	0.014	0.004172824	1	0.117	0.21566174	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 12. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00151	0.017667	0.004353	0.075	0.000326438	1	1.436	0.012530249	22.8	0.00	5.7	0.00
Cadmium	0.303	0.00151	0.00045753	0.002929	0.075	0.000219706	1	1.436	0.000471613	3.4	0.00	0.85	0.00
Chromium	10.44	0.00151	0.0157644	0.001988	0.075	0.000149063	1	1.436	0.011081798	5	0.00	1	0.01
Cobalt	6.38	0.00151	0.0096338	0.0044	0.075	0.00033	1	1.436	0.006938579	43.9	0.00	23.1	0.00
Copper	21.14	0.00151	0.0319214	0.047162	0.075	0.003537176	1	1.436	0.024692602	33.2	0.00	26.9	0.00
Lead	14.22	0.00151	0.0214722	0.000534	0.075	4.00781E-05	1	1.436	0.014980695	15	0.00	1.5	0.01
Manganese	748.8	0.00151	1.130688	8.719	0.075	0.653925	1	1.436	1.242766713	9770	0.00	977	0.00
Molybdenum	2.654	0.00151	0.00400754	NM	0.075	N/A	1	1.436	0.002790766	35.5	0.00	3.55	0.00
Nickel	8.92	0.00151	0.0134692	0.242769	0.075	0.018207656	1	1.436	0.022059092	79	0.00	57.2	0.00
Selenium	0.085	0.00151	0.00012835	0.001	0.075	0.000075	1	1.436	0.000141609	0.8	0.00	0.4	0.00
Thallium	0.24	0.00151	0.0003624	0.0003	0.075	0.0000225	1	1.436	0.000268036	1.2	0.00	0.12	0.00
Uranium	93.675	0.00151	0.14144925	0.1	0.075	0.0075	1	1.436	0.103725104	1600	0.00	160	0.00
Vanadium	23.26	0.00151	0.0351226	0.00025	0.075	0.00001875	1	1.436	0.024471692	114	0.00	11.4	0.00
Zinc	55.42	0.00151	0.0836842	0.298059	0.075	0.022354412	1	1.436	0.073843044	223.5	0.00	10.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 12. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00213	0.024921	0.004353	0.038	0.000165395	1	0.515	0.048711447	22.8	0.00	5.7	0.01
Cadmium	0.303	0.00213	0.00064539	0.002929	0.038	0.000111318	1	0.515	0.001469335	3.4	0.00	0.85	0.00
Chromium	10.44	0.00213	0.0222372	0.001988	0.038	0.000075525	1	0.515	0.04332568	5	0.01	1	0.04
Cobalt	6.38	0.00213	0.0135894	0.0044	0.038	0.0001672	1	0.515	0.026711845	43.9	0.00	23.1	0.00
Copper	21.14	0.00213	0.0450282	0.047162	0.038	0.001792169	1	0.515	0.090913339	33.2	0.00	26.9	0.00
Lead	14.22	0.00213	0.0302886	0.000534	0.038	2.03063E-05	1	0.515	0.058852245	15	0.00	1.5	0.04
Manganese	748.8	0.00213	1.594944	8.719	0.038	0.331322	1	0.515	3.74032233	9770	0.00	977	0.00
Molybdenum	2.654	0.00213	0.00565302	NM	0.038	N/A	1	0.515	0.010976738	35.5	0.00	3.55	0.00
Nickel	8.92	0.00213	0.0189996	0.242769	0.038	0.009225213	1	0.515	0.054805461	79	0.00	57.2	0.00
Selenium	0.085	0.00213	0.00018105	0.001	0.038	0.000038	1	0.515	0.00042534	0.8	0.00	0.4	0.00
Thallium	0.24	0.00213	0.0005112	0.0003	0.038	0.0000114	1	0.515	0.001014757	1.2	0.00	0.12	0.01
Uranium	93.675	0.00213	0.19952775	0.1	0.038	0.0038	1	0.515	0.394811165	1600	0.00	160	0.00
Vanadium	23.26	0.00213	0.0495438	0.00025	0.038	0.0000095	1	0.515	0.09622	114	0.00	11.4	0.01
Zinc	55.42	0.00213	0.1180446	0.298059	0.038	0.011326235	1	0.515	0.251205505	223.5	0.00	10.5	0.02

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 12. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0106		1	0.0771					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000724	0.0084708	0.004353	0.0106	4.61365E-05	1	0.0771	0.110466102	22.8	0.00	5.7	0.02
Cadmium	0.303	0.000724	0.000219372	0.002929	0.0106	3.10518E-05	1	0.0771	0.003248038	3.4	0.00	0.85	0.00
Chromium	10.44	0.000724	0.00755856	0.001988	0.0106	2.10675E-05	1	0.0771	0.098309047	5	0.02	1	0.10
Cobalt	6.38	0.000724	0.00461912	0.0044	0.0106	0.00004664	1	0.0771	0.060515694	43.9	0.00	23.1	0.00
Copper	21.14	0.000724	0.01530536	0.047162	0.0106	0.000499921	1	0.0771	0.204997159	33.2	0.01	26.9	0.01
Lead	14.22	0.000724	0.01029528	0.000534	0.0106	5.66438E-06	1	0.0771	0.133604985	15	0.01	1.5	0.09
Manganese	748.8	0.000724	0.5421312	8.719	0.0106	0.0924214	1	0.0771	8.230254215	9770	0.00	977	0.01
Molybdenum	2.654	0.000724	0.001921496	NM	0.0106	N/A	1	0.0771	0.024922127	35.5	0.00	3.55	0.01
Nickel	8.92	0.000724	0.00645808	0.242769	0.0106	0.002573349	1	0.0771	0.117139154	79	0.00	57.2	0.00
Selenium	0.085	0.000724	0.00006154	0.001	0.0106	0.0000106	1	0.0771	0.000935668	0.8	0.00	0.4	0.00
Thallium	0.24	0.000724	0.00017376	0.0003	0.0106	0.00000318	1	0.0771	0.002294942	1.2	0.00	0.12	0.02
Uranium	93.675	0.000724	0.0678207	0.1	0.0106	0.00106	1	0.0771	0.893394293	1600	0.00	160	0.01
Vanadium	23.26	0.000724	0.01684024	0.00025	0.0106	0.00000265	1	0.0771	0.218455123	114	0.00	11.4	0.02
Zinc	55.42	0.000724	0.04012408	0.298059	0.0106	0.003159424	1	0.0771	0.561394339	223.5	0.00	10.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 12. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000111	0.0012987	0.004353	0.0061	2.65503E-05	1	0.0394	0.033635793	9.63	0.00	1.91	0.02
Cadmium	0.303	0.000111	0.000033633	0.002929	0.0061	1.78694E-05	1	0.0394	0.001307168	2.3	0.00	0.23	0.01
Chromium	10.44	0.000111	0.00115884	0.001988	0.0061	1.21238E-05	1	0.0394	0.029719892	56.8	0.00	5.68	0.01
Cobalt	6.38	0.000111	0.00070818	0.0044	0.0061	0.00002684	1	0.0394	0.01865533	20	0.00	5	0.00
Copper	21.14	0.000111	0.00234654	0.047162	0.0061	0.00028769	1	0.0394	0.066858638	35.4	0.00	24.3	0.00
Lead	14.22	0.000111	0.00157842	0.000534	0.0061	3.25969E-06	1	0.0394	0.040144155	80	0.00	8	0.01
Manganese	748.8	0.000111	0.0831168	8.719	0.0061	0.0531859	1	0.0394	3.459459391	268	0.01	83	0.04
Molybdenum	2.654	0.000111	0.000294594	NM	0.0061	N/A	1	0.0394	0.007477005	1.9	0.00	0.19	0.04
Nickel	8.92	0.000111	0.00099012	0.242769	0.0061	0.001480889	1	0.0394	0.062715974	42.1	0.00	23.1	0.00
Selenium	0.085	0.000111	0.000009435	0.001	0.0061	0.0000061	1	0.0394	0.000394289	0.25	0.00	0.025	0.02
Thallium	0.24	0.000111	0.00002664	0.0003	0.0061	0.00000183	1	0.0394	0.000722589	0.74	0.00	0.074	0.01
Uranium	93.675	0.000111	0.010397925	0.1	0.0061	0.00061	1	0.0394	0.279388959	5	0.06	0.5	0.56
Vanadium	23.26	0.000111	0.00258186	0.00025	0.0061	0.000001525	1	0.0394	0.065568147	2.1	0.03	0.21	0.31
Zinc	55.42	0.000111	0.00615162	0.298059	0.0061	0.001818159	1	0.0394	0.20227865	225	0.00	22.5	0.01

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 12. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.083	0.9711	0.004353	3.61	0.015712525	1	68.6	0.014385022	9.63	0.00	1.91	0.01
Cadmium	0.303	0.083	0.025149	0.002929	3.61	0.010575176	1	68.6	0.000520761	2.3	0.00	0.23	0.00
Chromium	10.44	0.083	0.86652	0.001988	3.61	0.007174875	1	68.6	0.012736077	56.8	0.00	5.68	0.00
Cobalt	6.38	0.083	0.52954	0.0044	3.61	0.015884	1	68.6	0.007950787	20	0.00	5	0.00
Copper	21.14	0.083	1.75462	0.047162	3.61	0.170256094	1	68.6	0.028059418	35.4	0.00	24.3	0.00
Lead	14.22	0.083	1.18026	0.000534	3.61	0.001929094	1	68.6	0.017233077	80	0.00	8	0.00
Manganese	748.8	0.083	62.1504	8.719	3.61	31.47559	1	68.6	1.36481035	268	0.01	83	0.02
Molybdenum	2.654	0.083	0.220282	NM	3.61	N/A	1	68.6	0.003211108	1.9	0.00	0.19	0.02
Nickel	8.92	0.083	0.74036	0.242769	3.61	0.876395188	1	68.6	0.02356786	42.1	0.00	23.1	0.00
Selenium	0.085	0.083	0.007055	0.001	3.61	0.00361	1	68.6	0.000155466	0.25	0.00	0.025	0.01
Thallium	0.24	0.083	0.01992	0.0003	3.61	0.001083	1	68.6	0.000306166	0.74	0.00	0.074	0.00
Uranium	93.675	0.083	7.775025	0.1	3.61	0.361	1	68.6	0.118600948	5	0.02	0.5	0.24
Vanadium	23.26	0.083	1.93058	0.00025	3.61	0.0009025	1	68.6	0.028155722	2.1	0.01	0.21	0.13
Zinc	55.42	0.083	4.59986	0.298059	3.61	1.075992353	1	68.6	0.082738372	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 12. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.0072	0.08424	0.004353	1.02	0.00443955	1	13.3	0.006667635	9.63	0.00	1.91	0.00
Cadmium	0.303	0.0072	0.0021816	0.002929	1.02	0.002988	1	13.3	0.000388692	2.3	0.00	0.23	0.00
Chromium	10.44	0.0072	0.075168	0.001988	1.02	0.00202725	1	13.3	0.005804154	56.8	0.00	5.68	0.00
Cobalt	6.38	0.0072	0.045936	0.0044	1.02	0.004488	1	13.3	0.003791278	20	0.00	5	0.00
Copper	21.14	0.0072	0.152208	0.047162	1.02	0.0481056	1	13.3	0.015061173	35.4	0.00	24.3	0.00
Lead	14.22	0.0072	0.102384	0.000534	1.02	0.000545063	1	13.3	0.007739027	80	0.00	8	0.00
Manganese	748.8	0.0072	5.39136	8.719	1.02	8.89338	1	13.3	1.074040602	268	0.00	83	0.01
Molybdenum	2.654	0.0072	0.0191088	NM	1.02	N/A	1	13.3	0.001436752	1.9	0.00	0.19	0.01
Nickel	8.92	0.0072	0.064224	0.242769	1.02	0.247624125	1	13.3	0.023447227	42.1	0.00	23.1	0.00
Selenium	0.085	0.0072	0.000612	0.001	1.02	0.00102	1	13.3	0.000122707	0.25	0.00	0.025	0.00
Thallium	0.24	0.0072	0.001728	0.0003	1.02	0.000306	1	13.3	0.000152932	0.74	0.00	0.074	0.00
Uranium	93.675	0.0072	0.67446	0.1	1.02	0.102	1	13.3	0.058380451	5	0.01	0.5	0.12
Vanadium	23.26	0.0072	0.167472	0.00025	1.02	0.000255	1	13.3	0.012611053	2.1	0.01	0.21	0.06
Zinc	55.42	0.0072	0.399024	0.298059	1.02	0.30402	1	13.3	0.052860451	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 12. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00529	0.061893	0.004353	0.73	0.003177325	1	9.2	0.007072861	9.63	0.00	1.91	0.00
Cadmium	0.303	0.00529	0.00160287	0.002929	0.73	0.002138471	1	9.2	0.000406667	2.3	0.00	0.23	0.00
Chromium	10.44	0.00529	0.0552276	0.001988	0.73	0.001450875	1	9.2	0.006160704	56.8	0.00	5.68	0.00
Cobalt	6.38	0.00529	0.0337502	0.0044	0.73	0.003212	1	9.2	0.00401763	20	0.00	5	0.00
Copper	21.14	0.00529	0.1118306	0.047162	0.73	0.034428518	1	9.2	0.01589773	35.4	0.00	24.3	0.00
Lead	14.22	0.00529	0.0752238	0.000534	0.73	0.000390094	1	9.2	0.008218901	80	0.00	8	0.00
Manganese	748.8	0.00529	3.961152	8.719	0.73	6.36487	1	9.2	1.122393696	268	0.00	83	0.01
Molybdenum	2.654	0.00529	0.01403966	NM	0.73	N/A	1	9.2	0.00152605	1.9	0.00	0.19	0.01
Nickel	8.92	0.00529	0.0471868	0.242769	0.73	0.177221188	1	9.2	0.024392173	42.1	0.00	23.1	0.00
Selenium	0.085	0.00529	0.00044965	0.001	0.73	0.00073	1	9.2	0.000128223	0.25	0.00	0.025	0.01
Thallium	0.24	0.00529	0.0012696	0.0003	0.73	0.000219	1	9.2	0.000161804	0.74	0.00	0.074	0.00
Uranium	93.675	0.00529	0.49554075	0.1	0.73	0.073	1	9.2	0.061797908	5	0.01	0.5	0.12
Vanadium	23.26	0.00529	0.1230454	0.00025	0.73	0.0001825	1	9.2	0.013394337	2.1	0.01	0.21	0.06
Zinc	55.42	0.00529	0.2931718	0.298059	0.73	0.217582941	1	9.2	0.05551682	225	0.00	22.5	0.00

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 12. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231		1	0.00428					
Arsenic	11.7	0.000155	0.0018135	0.004353	0.00231	1.00543E-05	1	0.00428	0.426064083	9.63	0.04	1.91	0.22
Cadmium	0.303	0.000155	0.000046965	0.002929	0.00231	6.76694E-06	1	0.00428	0.012554192	2.3	0.01	0.23	0.05
Chromium	10.44	0.000155	0.0016182	0.001988	0.00231	4.59113E-06	1	0.00428	0.379156805	56.8	0.01	5.68	0.07
Cobalt	6.38	0.000155	0.0009889	0.0044	0.00231	0.000010164	1	0.00428	0.233426168	20	0.01	5	0.05
Copper	21.14	0.000155	0.0032767	0.047162	0.00231	0.000108945	1	0.00428	0.79103856	35.4	0.02	24.3	0.03
Lead	14.22	0.000155	0.0022041	0.000534	0.00231	1.23441E-06	1	0.00428	0.515265048	80	0.01	8	0.06
Manganese	748.8	0.000155	0.116064	8.719	0.00231	0.02014089	1	0.00428	31.82357243	268	0.12	83	0.38
Molybdenum	2.654	0.000155	0.00041137	NM	0.00231	N/A	1	0.00428	0.096114486	1.9	0.05	0.19	0.51
Nickel	8.92	0.000155	0.0013826	0.242769	0.00231	0.000560796	1	0.00428	0.454064442	42.1	0.01	23.1	0.02
Selenium	0.085	0.000155	0.000013175	0.001	0.00231	0.00000231	1	0.00428	0.003617991	0.25	0.01	0.025	0.14
Thallium	0.24	0.000155	0.0000372	0.0003	0.00231	0.000000693	1	0.00428	0.008853505	0.74	0.01	0.074	0.12
Uranium	93.675	0.000155	0.014519625	0.1	0.00231	0.000231	1	0.00428	3.44640771	5	0.69	0.5	**6.89**
Vanadium	23.26	0.000155	0.0036053	0.00025	0.00231	5.775E-07	1	0.00428	0.842494743	2.1	0.40	0.21	**4.01**
Zinc	55.42	0.000155	0.0085901	0.298059	0.00231	0.000688516	1	0.00428	2.167900907	225	0.01	22.5	0.10

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 12. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 2: Representative Life History Parameters, Central Tendency Metal Concentrations
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000317	0.0037089	0.004353	0.00229	9.96723E-06	1	0.0185	0.20101985	9.63	0.02	1.91	0.11
Cadmium	0.303	0.000317	0.000096051	0.002929	0.00229	6.70835E-06	1	0.0185	0.00555456	2.3	0.00	0.23	0.02
Chromium	10.44	0.000317	0.00330948	0.001988	0.00229	4.55138E-06	1	0.0185	0.179136831	56.8	0.00	5.68	0.03
Cobalt	6.38	0.000317	0.00202246	0.0044	0.00229	0.000010076	1	0.0185	0.109866811	20	0.01	5	0.02
Copper	21.14	0.000317	0.00670138	0.047162	0.00229	0.000108002	1	0.0185	0.368074691	35.4	0.01	24.3	0.02
Lead	14.22	0.000317	0.00450774	0.000534	0.00229	1.22372E-06	1	0.0185	0.243727769	80	0.00	8	0.03
Manganese	748.8	0.000317	0.2373696	8.719	0.00229	0.01996651	1	0.0185	13.91006	268	0.05	83	0.17
Molybdenum	2.654	0.000317	0.000841318	NM	0.00229	N/A	1	0.0185	0.045476649	1.9	0.02	0.19	0.24
Nickel	8.92	0.000317	0.00282764	0.242769	0.00229	0.00055594	1	0.0185	0.18289624	42.1	0.00	23.1	0.01
Selenium	0.085	0.000317	0.000026945	0.001	0.00229	0.00000229	1	0.0185	0.00158027	0.25	0.01	0.025	0.06
Thallium	0.24	0.000317	0.00007608	0.0003	0.00229	0.000000687	1	0.0185	0.004149568	0.74	0.01	0.074	0.06
Uranium	93.675	0.000317	0.029694975	0.1	0.00229	0.000229	1	0.0185	1.617512162	5	0.32	0.5	**3.24**
Vanadium	23.26	0.000317	0.00737342	0.00025	0.00229	5.725E-07	1	0.0185	0.398594189	2.1	0.19	0.21	**1.90**
Zinc	55.42	0.000317	0.01756814	0.298059	0.00229	0.000682555	1	0.0185	0.986524038	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 23. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000142			0.00473			100	0.0148858		1	0.0231					
Arsenic	16.350	0.0000142	0.00023217	0.0025	0.00473	0.000011825	2.1	100	0.0148858	0.03126018	1	0.0231	1.3638171	22.8	0.06	5.7	0.24
Cadmium	0.381	0.0000142	5.40931E-06	0.0008803	0.00473	4.16368E-06	1.3	100	0.0148858	0.01935154	1	0.0231	0.83814342	3.4	0.25	0.85	0.99
Chromium	12.813	0.0000142	0.000181938	0.0020391	0.00473	9.64515E-06	2.2	100	0.0148858	0.03274876	1	0.0231	1.425988859	5	0.29	1	**1.43**
Cobalt	8.806	0.0000142	0.000125049	0.0007656	0.00473	3.62141E-06	1.26	100	0.0148858	0.018756108	1	0.0231	0.817522864	43.9	0.02	23.1	0.04
Copper	20.075	0.0000142	0.000285065	0.0044	0.00473	0.000020812	69.1	100	0.0148858	1.02860878	1	0.0231	44.54176004	33.2	**1.34**	26.9	**1.66**
Lead	13.669	0.0000142	0.000194096	0.0006957	0.00473	3.29073E-06	3.5	100	0.0148858	0.0521003	1	0.0231	2.263969133	15	0.15	1.5	**1.51**
Manganese	744.750	0.0000142	0.01057545	0.0944	0.00473	0.000446512	108	100	0.0148858	1.6076664	1	0.0231	70.07308926	9770	0.01	977	0.07
Molybdenum	2.030	0.0000142	0.000028826	NM	0.00473	N/A	NM	100	0.0148858	N/A	1	0.0231	N/A	35.5	N/A	3.55	N/A
Nickel	12.581	0.0000142	0.000178654	NM	0.00473	N/A	2	100	0.0148858	0.0297716	1	0.0231	1.296547781	79	0.02	57.2	0.02
Selenium	0.095	0.0000142	0.000001349	0.0005	0.00473	0.000002365	0.3	100	0.0148858	0.00446574	1	0.0231	0.193482857	0.8	0.24	0.4	0.48
Thallium	0.167	0.0000142	2.36667E-06	0.0015	0.00473	0.000007095	0.1	100	0.0148858	0.00148858	1	0.0231	0.064850289	1.2	0.05	0.12	0.54
Uranium	32.048	0.0000142	0.000455086	0.0505	0.00473	0.000238865	7.52	100	0.0148858	0.111941216	1	0.0231	4.87598127	1600	0.00	160	0.03
Vanadium	25.706	0.0000142	0.000365029	0.0013647	0.00473	6.45497E-06	NM	100	0.0148858	N/A	1	0.0231	N/A	114	N/A	11.4	N/A
Zinc	52.363	0.0000142	0.000743548	0.0297351	0.00473	0.000140647	152	100	0.0148858	2.2626416	1	0.0231	97.98812964	223.5	0.44	10.5	**9.33**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 23. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045			60		40	0.004914		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.000256	0.0041856	0.0025	0.0045	0.00001125	4	60	2.1	40	0.004914	0.01592136	1	0.0218	0.92285367	22.8	0.04	5.7	0.16
Cadmium	0.381	0.000256	0.00009752	0.0008803	0.0045	3.96122E-06	2.1	60	1.3	40	0.004914	0.00874692	1	0.0218	0.405889964	3.4	0.12	0.85	0.48
Chromium	12.813	0.000256	0.00328	0.0020391	0.0045	9.17614E-06	0.7	60	2.2	40	0.004914	0.0063882	1	0.0218	0.443916337	5	0.09	1	0.44
Cobalt	8.806	0.000256	0.0022544	0.0007656	0.0045	3.44531E-06	0.3	60	1.26	40	0.004914	0.003361176	1	0.0218	0.257753271	43.9	0.01	23.1	0.01
Copper	20.075	0.000256	0.0051392	0.0044	0.0045	0.0000198	5	60	69.1	40	0.004914	0.15056496	1	0.0218	7.143300917	33.2	0.22	26.9	0.27
Lead	13.669	0.000256	0.0034992	0.0006957	0.0045	3.13071E-06	0.5	60	3.5	40	0.004914	0.0083538	1	0.0218	0.543859207	15	0.04	1.5	0.36
Manganese	744.750	0.000256	0.190656	0.0944	0.0045	0.0004248	610	60	108	40	0.004914	2.0108088	1	0.0218	101.0041101	9770	0.01	977	0.10
Molybdenum	2.030	0.000256	0.00051968	NM	0.0045	N/A	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	12.581	0.000256	0.0032208	0.0259003	0.0045	0.000116551	5	60	2	40	0.004914	0.0186732	1	0.0218	1.009658316	79	0.01	57.2	0.02
Selenium	0.095	0.000256	0.00002432	0.0005	0.0045	0.00000225	0.05	60	0.3	40	0.004914	0.0007371	1	0.0218	0.035030734	0.8	0.04	0.4	0.09
Thallium	0.167	0.000256	4.26667E-05	0.0015	0.0045	0.00000675	0.05	60	0.1	40	0.004914	0.00034398	1	0.0218	0.018045719	1.2	0.02	0.12	0.15
Uranium	32.048	0.000256	0.008204373	0.0505	0.0045	0.00022725	4.381676	60	7.52	40	0.004914	0.027700246	1	0.0218	1.657425177	1,600	0.00	160	0.01
Vanadium	25.706	0.000256	0.0065808	0.0013647	0.0045	6.14109E-06	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	52.363	0.000256	0.0134048	0.0297351	0.0045	0.000133808	40	60	152	40	0.004914	0.4167072	1	0.0218	19.73604624	223.5	0.09	10.5	**1.88**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 23. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			100	0.004914		1	0.0218					
Arsenic	16.350	0.000256	0.0041856	0.0025	0.0045	0.00001125	4	100	0.004914	0.019656	1	0.0218	1.094167431	22.8	0.05	5.7	0.19
Cadmium	0.381	0.000256	0.00009752	0.00088	0.0045	3.96122E-06	2.1	100	0.004914	0.0103194	1	0.0218	0.478022074	3.4	0.14	0.85	0.56
Chromium	12.813	0.000256	0.00328	0.002039	0.0045	9.17614E-06	0.7	100	0.004914	0.0034398	1	0.0218	0.30866863	5	0.06	1	0.31
Cobalt	8.806	0.000256	0.0022544	0.000766	0.0045	3.44531E-06	0.3	100	0.004914	0.0014742	1	0.0218	0.171194739	43.9	0.00	23.1	0.01
Copper	20.075	0.000256	0.0051392	0.0044	0.0045	0.0000198	5	100	0.004914	0.02457	1	0.0218	1.363715596	33.2	0.04	26.9	0.05
Lead	13.669	0.000256	0.0034992	0.000696	0.0045	3.13071E-06	0.5	100	0.004914	0.002457	1	0.0218	0.273363794	15	0.02	1.5	0.18
Manganese	744.750	0.000256	0.190656	0.0944	0.0045	0.0004248	610	100	0.004914	2.99754	1	0.0218	146.2670092	9770	0.01	977	0.15
Molybdenum	2.030	0.000256	0.00051968	NM	0.0045	N/A	NM	100	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	12.581	0.000256	0.0032208	0.0259	0.0045	0.000116551	5	100	0.004914	0.02457	1	0.0218	1.280153729	79	0.02	57.2	0.02
Selenium	0.095	0.000256	0.00002432	0.0005	0.0045	0.00000225	0.05	100	0.004914	0.0002457	1	0.0218	0.01248945	0.8	0.02	0.4	0.03
Thallium	0.167	0.000256	4.26667E-05	0.0015	0.0045	0.00000675	0.05	100	0.004914	0.0002457	1	0.0218	0.013537462	1.2	0.01	0.12	0.11
Uranium	32.048	0.000256	0.008204373	0.0505	0.0045	0.00022725	4.381676	100	0.004914	0.0215316	1	0.0218	1.374457761	1600	0.00	160	0.01
Vanadium	25.706	0.000256	0.0065808	0.001365	0.0045	6.14109E-06	NM	100	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	52.363	0.000256	0.0134048	0.029735	0.0045	0.000133808	40	100	0.004914	0.19656	1	0.0218	9.637550831	223.5	0.04	10.5	0.92

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 23. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014				100	0.00792		1	0.117					
Arsenic	16.350	0.00038	0.006213	0.0025	0.014	0.000035	0.071	1.16085	100	0.00792	0.00919393	1	0.117	0.131982325	22.8	0.01	5.7	0.02
Cadmium	0.381	0.00038	0.000144756	0.00088	0.014	1.23238E-05	69.561	26.49839344	100	0.00792	0.20986728	1	0.117	1.795079966	3.4	0.53	0.85	**2.11**
Chromium	12.813	0.00038	0.00486875	0.002039	0.014	2.8548E-05	0.8	10.25	100	0.00792	0.08118	1	0.117	0.735703402	5	0.15	1	0.74
Cobalt	8.806	0.00038	0.003346375	0.000766	0.014	1.07188E-05	0.18	1.585125	100	0.00792	0.01255419	1	0.117	0.135993878	43.9	0.00	23.1	0.01
Copper	20.075	0.00038	0.0076285	0.0044	0.014	0.0000616	1.398	28.06485	100	0.00792	0.22227361	1	0.117	1.965501812	33.2	0.06	26.9	0.07
Lead	13.669	0.00038	0.005194125	0.000696	0.014	9.74E-06	2.659	36.34520625	100	0.00792	0.28785403	1	0.117	2.504768363	15	0.17	1.5	**1.67**
Manganese	744.750	0.00038	0.283005	0.0944	0.014	0.0013216	0.079	58.83525	100	0.00792	0.46597518	1	0.117	6.412835726	9770	0.00	977	0.01
Molybdenum	2.030	0.00038	0.0007714	NM	0.014	N/A	1	2.03	100	0.00792	0.0160776	1	0.117	0.144008547	35.5	0.00	3.55	0.04
Nickel	12.581	0.00038	0.004780875	0.0259	0.014	0.000362604	1.143	14.38036875	100	0.00792	0.11389252	1	0.117	1.017401705	79	0.01	57.2	0.02
Selenium	0.095	0.00038	0.0000361	0.0005	0.014	0.000007	1.754	0.16663	100	0.00792	0.00131971	1	0.117	0.011647945	0.8	0.01	0.4	0.03
Thallium	0.167	0.00038	6.33333E-05	0.0015	0.014	0.000021	0.123	0.0205	100	0.00792	0.00016236	1	0.117	0.00210849	1.2	0.00	0.12	0.02
Uranium	32.048	0.00038	0.012178367	0.0505	0.014	0.000707	1	32.04833333	100	0.00792	0.2538228	1	0.117	2.27955698	1600	0.00	160	0.01
Vanadium	25.706	0.00038	0.009768375	0.001365	0.014	1.91056E-05	0.019	0.48841875	100	0.00792	0.00386828	1	0.117	0.116715873	114	0.00	11.4	0.01
Zinc	52.363	0.00038	0.01989775	0.029735	0.014	0.000416292	16.364	856.85995	100	0.00792	6.7863308	1	0.117	58.17645167	223.5	0.26	10.5	**5.54**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 23. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00151			0.075				100	0.03129		1	1.436					
Arsenic	16.350	0.00151	0.0246885	0.0025	0.075	0.0001875	0.071	1.16085	100	0.03129	0.036323	1	1.436	0.042617686	22.8	0.00	5.7	0.01
Cadmium	0.381	0.00151	0.000575216	0.00088	0.075	6.60203E-05	69.561	26.49839344	100	0.03129	0.82913473	1	1.436	0.577838417	3.4	0.17	0.85	0.68
Chromium	12.813	0.00151	0.019346875	0.002039	0.075	0.000152936	0.8	10.25	100	0.03129	0.3207225	1	1.436	0.236923615	5	0.05	1	0.24
Cobalt	8.806	0.00151	0.013297438	0.000766	0.075	5.74219E-05	0.18	1.585125	100	0.03129	0.04959856	1	1.436	0.043839429	43.9	0.00	23.1	0.00
Copper	20.075	0.00151	0.03031325	0.0044	0.075	0.00033	1.398	28.06485	100	0.03129	0.87814916	1	1.436	0.632863793	33.2	0.02	26.9	0.02
Lead	13.669	0.00151	0.020639813	0.000696	0.075	5.21786E-05	2.659	36.34520625	100	0.03129	1.1372415	1	1.436	0.806360372	15	0.05	1.5	0.54
Manganese	744.750	0.00151	1.1245725	0.0944	0.075	0.00708	0.079	58.83525	100	0.03129	1.84095497	1	1.436	2.070060914	9770	0.00	977	0.00
Molybdenum	2.030	0.00151	0.0030653	0	0.075	N/A	1	2.03	100	0.03129	0.0635187	1	1.436	0.046367688	35.5	0.00	3.55	0.01
Nickel	12.581	0.00151	0.018997688	0.0259	0.075	0.001942521	1.143	14.38036875	100	0.03129	0.44996174	1	1.436	0.327926147	79	0.00	57.2	0.01
Selenium	0.095	0.00151	0.00014345	0.0005	0.075	0.0000375	1.754	0.16663	100	0.03129	0.00521385	1	1.436	0.003756826	0.8	0.00	0.4	0.01
Thallium	0.167	0.00151	0.000251667	0.0015	0.075	0.0001125	0.123	0.0205	100	0.03129	0.00064145	1	1.436	0.000700287	1.2	0.00	0.12	0.01
Uranium	32.048	0.00151	0.048392983	0.0505	0.075	0.0037875	1	32.04833333	100	0.03129	1.00279235	1	1.436	0.734660747	1600	0.00	160	0.00
Vanadium	25.706	0.00151	0.038816438	0.001365	0.075	0.000102352	0.019	0.48841875	100	0.03129	0.01528262	1	1.436	0.037744716	114	0.00	11.4	0.00
Zinc	52.363	0.00151	0.079067375	0.029735	0.075	0.002230135	16.364	856.85995	100	0.03129	26.8111478	1	1.436	18.72732963	223.5	0.08	10.5	**1.78**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 23. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00213			0.038			100	0.02077		1	0.515					
Arsenic	16.350	0.00213	0.0348255	0.0025	0.038	0.000095	4	100	0.02077	0.08308	1	0.515	0.229127184	22.8	0.01	5.7	0.04
Cadmium	0.381	0.00213	0.000811397	0.00088	0.038	3.34503E-05	2.1	100	0.02077	0.043617	1	0.515	0.086333684	3.4	0.03	0.85	0.10
Chromium	12.813	0.00213	0.027290625	0.002039	0.038	7.74874E-05	0.7	100	0.02077	0.014539	1	0.515	0.081373034	5	0.02	1	0.08
Cobalt	8.806	0.00213	0.018757313	0.000766	0.038	2.90938E-05	0.3	100	0.02077	0.006231	1	0.515	0.048577488	43.9	0.00	23.1	0.00
Copper	20.075	0.00213	0.04275975	0.0044	0.038	0.0001672	5	100	0.02077	0.10385	1	0.515	0.285003786	33.2	0.01	26.9	0.01
Lead	13.669	0.00213	0.029114438	0.000696	0.038	2.64371E-05	0.5	100	0.02077	0.010385	1	0.515	0.076749271	15	0.01	1.5	0.05
Manganese	744.750	0.00213	1.5863175	0.0944	0.038	0.0035872	610	100	0.02077	12.6697	1	0.515	27.68855282	9770	0.00	977	0.03
Molybdenum	2.030	0.00213	0.0043239	NM	0.038	N/A	NM	100	0.02077	N/A	1	0.515	N/A	35.5	N/A	3.55	N/A
Nickel	12.581	0.00213	0.026798063	0.0259	0.038	0.000984211	5	100	0.02077	0.10385	1	0.515	0.255596647	79	0.00	57.2	0.00
Selenium	0.095	0.00213	0.00020235	0.0005	0.038	0.000019	0.05	100	0.02077	0.0010385	1	0.515	0.002446311	0.8	0.00	0.4	0.01
Thallium	0.167	0.00213	0.000355	0.0015	0.038	0.000057	0.05	100	0.02077	0.0010385	1	0.515	0.002816505	1.2	0.00	0.12	0.02
Uranium	32.048	0.00213	0.06826295	0.0505	0.038	0.001919	4.381676	100	0.02077	0.0910074	1	0.515	0.31298905	1600	0.00	160	0.00
Vanadium	25.706	0.00213	0.054754313	0.001365	0.038	5.18581E-05	NM	100	0.02077	N/A	1	0.515	N/A	114	N/A	11.4	N/A
Zinc	52.363	0.00213	0.111532125	0.029735	0.038	0.001129935	40	100	0.02077	0.8308	1	0.515	1.831965165	223.5	0.01	10.5	0.17

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PM 23. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0106				100	0.006236		1	0.0771					
Arsenic	16.350	0.000724	0.0118374	0.0025	0.0106	0.0000265	0.925	15.12375	100	0.006236	0.0943117	1	0.0771	1.377115499	22.8	0.06	5.7	0.24
Cadmium	0.381	0.000724	0.000275799	0.00088	0.0106	9.33086E-06	190	72.378125	100	0.006236	0.45135	1	0.0771	5.85778362	3.4	**1.72**	0.85	**6.89**
Chromium	12.813	0.000724	0.00927625	0.002039	0.0106	2.16149E-05	11.416	146.2675	100	0.006236	0.9121241	1	0.0771	11.95099864	5	**2.39**	1	**11.95**
Cobalt	8.806	0.000724	0.006375725	0.000766	0.0106	8.11563E-06	0.321	2.82680625	100	0.006236	0.017628	1	0.0771	0.311437152	43.9	0.01	23.1	0.01
Copper	20.075	0.000724	0.0145343	0.0044	0.0106	0.00004664	5.492	110.2519	100	0.006236	0.6875308	1	0.0771	9.10650828	33.2	0.27	26.9	0.34
Lead	13.669	0.000724	0.009896175	0.000696	0.0106	7.37457E-06	228.261	3120.04254	100	0.006236	19.456585	1	0.0771	252.4836427	15	**16.83**	1.5	**168.32**
Manganese	744.750	0.000724	0.539199	0.0944	0.0106	0.00100064	0.228	169.803	100	0.006236	1.0588915	1	0.0771	20.74048182	9770	0.00	977	0.02
Molybdenum	2.030	0.000724	0.00146972	NM	0.0106	N/A	2.091	4.24473	100	0.006236	0.0264701	1	0.0771	0.362384647	35.5	0.01	3.55	0.10
Nickel	12.581	0.000724	0.009108825	0.0259	0.0106	0.000274543	7.802	98.1589125	100	0.006236	0.612119	1	0.0771	8.060990225	79	0.10	57.2	0.14
Selenium	0.095	0.000724	0.00006878	0.0005	0.0106	0.0000053	13.733	1.304635	100	0.006236	0.0081357	1	0.0771	0.106482281	0.8	0.13	0.4	0.27
Thallium	0.167	0.000724	0.000120667	0.0015	0.0106	0.0000159	1	0.16666667	100	0.006236	0.0010393	1	0.0771	0.015251621	1.2	0.01	0.12	0.13
Uranium	32.048	0.000724	0.023202993	0.0505	0.0106	0.0005353	0.063	2.019045	100	0.006236	0.0125908	1	0.0771	0.471194007	1600	0.00	160	0.00
Vanadium	25.706	0.000724	0.018611325	0.001365	0.0106	1.44657E-05	0.088	2.26215	100	0.006236	0.0141068	1	0.0771	0.424546798	114	0.00	11.4	0.04
Zinc	52.363	0.000724	0.03791045	0.029735	0.0106	0.000315192	49.51	2592.46738	100	0.006236	16.166627	1	0.0771	210.1796653	223.5	0.94	10.5	**20.02**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 29. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	16.350	0.000111	0.00181485	0.0025	0.0061	0.00001525	19	100	0.004929	0.093651	1	0.0394	2.423378173	9.63	0.25	1.91	**1.27**
Cadmium	0.381	0.000111	4.22841E-05	0.00088	0.0061	5.36965E-06	4	100	0.004929	0.019716	1	0.0394	0.501615576	2.3	0.22	0.23	**2.18**
Chromium	12.813	0.000111	0.001422188	0.002039	0.0061	1.24388E-05	16	100	0.004929	0.078864	1	0.0394	2.0380362	56.8	0.04	5.68	0.36
Cobalt	8.806	0.000111	0.000977494	0.000766	0.0061	4.67031E-06	15	100	0.004929	0.073935	1	0.0394	1.901450865	20	0.10	5	0.38
Copper	20.075	0.000111	0.002228325	0.0044	0.0061	0.00002684	116	100	0.004929	0.571764	1	0.0394	14.56901434	35.4	0.41	24.3	0.60
Lead	13.669	0.000111	0.001517231	0.000696	0.0061	4.24386E-06	37.9	100	0.004929	0.1868091	1	0.0394	4.779963835	80	0.06	8	0.60
Manganese	744.750	0.000111	0.08266725	0.0944	0.0061	0.00057584	1420	100	0.004929	6.99918	1	0.0394	179.7569312	268	0.67	83	**2.17**
Molybdenum	2.030	0.000111	0.00022533	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	12.581	0.000111	0.001396519	0.0259	0.0061	0.000157992	26	100	0.004929	0.128154	1	0.0394	3.292094175	42.1	0.08	23.1	0.14
Selenium	0.095	0.000111	0.000010545	0.0005	0.0061	0.00000305	0.5	100	0.004929	0.0024645	1	0.0394	0.062895812	0.25	0.25	0.025	**2.52**
Thallium	0.167	0.000111	1.85E-05	0.0015	0.0061	0.00000915	0.4	100	0.004929	0.0019716	1	0.0394	0.050742386	0.74	0.07	0.074	0.69
Uranium	32.048	0.000111	0.003557365	0.0505	0.0061	0.00030805	876.08901	100	0.004929	4.3182427	1	0.0394	109.6981763	5	**21.94**	0.5	**219.40**
Vanadium	25.706	0.000111	0.002853394	0.001365	0.0061	8.32459E-06	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	52.363	0.000111	0.005812238	0.029735	0.0061	0.000181384	147	100	0.004929	0.724563	1	0.0394	18.54204624	225	0.08	22.5	0.82

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 35. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	16.350	0.000111	0.00181485	0.0025	0.0061	0.00001525	4	100	0.004929	0.019716	1	0.0394	0.54685533	9.63	0.06	1.91	0.29
Cadmium	0.381	0.000111	4.22841E-05	0.00088	0.0061	5.36965E-06	2.1	100	0.004929	0.0103509	1	0.0394	0.263922683	2.3	0.11	0.23	**1.15**
Chromium	12.813	0.000111	0.001422188	0.002039	0.0061	1.24388E-05	0.7	100	0.004929	0.0034503	1	0.0394	0.1239829	56.8	0.00	5.68	0.02
Cobalt	8.806	0.000111	0.000977494	0.000766	0.0061	4.67031E-06	0.3	100	0.004929	0.0014787	1	0.0394	0.062458479	20	0.00	5	0.01
Copper	20.075	0.000111	0.002228325	0.0044	0.0061	0.00002684	5	100	0.004929	0.024645	1	0.0394	0.682745305	35.4	0.02	24.3	0.03
Lead	13.669	0.000111	0.001517231	0.000696	0.0061	4.24386E-06	0.5	100	0.004929	0.0024645	1	0.0394	0.101166881	80	0.00	8	0.01
Manganese	744.750	0.000111	0.08266725	0.0944	0.0061	0.00057584	610	100	0.004929	3.00669	1	0.0394	78.42469772	268	0.29	83	0.94
Molybdenum	2.030	0.000111	0.00022533	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	12.581	0.000111	0.001396519	0.0259	0.0061	0.000157992	5	100	0.004929	0.024645	1	0.0394	0.664962195	42.1	0.02	23.1	0.03
Selenium	0.095	0.000111	0.000010545	0.0005	0.0061	0.00000305	0.05	100	0.004929	0.0002465	1	0.0394	0.006600127	0.25	0.03	0.025	0.26
Thallium	0.167	0.000111	1.85E-05	0.0015	0.0061	0.00000915	0.05	100	0.004929	0.0002465	1	0.0394	0.006956853	0.74	0.01	0.074	0.09
Uranium	32.048	0.000111	0.003557365	0.0505	0.0061	0.00030805	4.381676	100	0.004929	0.0215973	1	0.0394	0.64626132	5	0.13	0.5	**1.29**
Vanadium	25.706	0.000111	0.002853394	0.001365	0.0061	8.32459E-06	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	52.363	0.000111	0.005812238	0.029735	0.0061	0.000181384	40	100	0.004929	0.19716	1	0.0394	5.156183295	225	0.02	22.5	0.23

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 23. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61			100	1.517		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	16.350	0.083	1.35705	0.0025	3.61	0.009025	4	100	1.517	6.068	1	68.6	0.10836844	9.63	0.01	1.91	0.06
Cadmium	0.381	0.083	0.031617813	0.00088	3.61	0.003177776	2.1	100	1.517	3.1857	1	68.6	0.046946	2.3	0.02	0.23	0.20
Chromium	12.813	0.083	1.0634375	0.002039	3.61	0.007361306	0.7	100	1.517	1.0619	1	68.6	0.031088904	56.8	0.00	5.68	0.01
Cobalt	8.806	0.083	0.73091875	0.000766	3.61	0.002763906	0.3	100	1.517	0.4551	1	68.6	0.017329193	20	0.00	5	0.00
Copper	20.075	0.083	1.666225	0.0044	3.61	0.015884	5	100	1.517	7.585	1	68.6	0.135089052	35.4	0.00	24.3	0.01
Lead	13.669	0.083	1.13450625	0.000696	3.61	0.002511529	0.5	100	1.517	0.7585	1	68.6	0.027631454	80	0.00	8	0.00
Manganese	744.750	0.083	61.81425	0.0944	3.61	0.340784	610	100	1.517	925.37	1	68.6	14.39540866	268	0.05	83	0.17
Molybdenum	2.030	0.083	0.16849	NM	3.61	N/A	NM	100	1.517	N/A	1	68.6	N/A	1.9	N/A	0.19	N/A
Nickel	12.581	0.083	1.04424375	0.0259	3.61	0.093500031	5	100	1.517	7.585	1	68.6	0.127153699	42.1	0.00	23.1	0.01
Selenium	0.095	0.083	0.007885	0.0005	3.61	0.001805	0.05	100	1.517	0.07585	1	68.6	0.001246939	0.25	0.00	0.025	0.05
Thallium	0.167	0.083	0.013833333	0.0015	3.61	0.005415	0.05	100	1.517	0.07585	1	68.6	0.001386273	0.74	0.00	0.074	0.02
Uranium	32.048	0.083	2.660011666	0.0505	3.61	0.182305	4.381676	100	1.517	6.6470025	1	68.6	0.138328268	5	0.03	0.5	0.28
Vanadium	25.706	0.083	2.13361875	0.001365	3.61	0.004926522	NM	100	1.517	N/A	1	68.6	N/A	2.1	N/A	0.21	N/A
Zinc	52.363	0.083	4.3460875	0.029735	3.61	0.107343838	40	100	1.517	60.68	1	68.6	0.949466929	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 23. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0072			1.02				100	0.2498		1	13.3					
Arsenic	16.350	0.0072	0.11772	0.0025	1.02	0.00255	0.071	1.16085	100	0.2498	0.28998033	1	13.3	0.030845889	9.63	0.00	1.91	0.02
Cadmium	0.381	0.0072	0.00274275	0.00088	1.02	0.000897876	69.561	26.49839344	100	0.2498	6.61929868	1	13.3	0.497965361	2.3	0.22	0.23	**2.17**
Chromium	12.813	0.0072	0.09225	0.002039	1.02	0.002079926	0.8	10.25	100	0.2498	2.56045	1	13.3	0.199607513	56.8	0.00	5.68	0.04
Cobalt	8.806	0.0072	0.063405	0.000766	1.02	0.000780938	0.18	1.585125	100	0.2498	0.39596423	1	13.3	0.034597757	20	0.00	5	0.01
Copper	20.075	0.0072	0.14454	0.0044	1.02	0.004488	1.398	28.06485	100	0.2498	7.01059953	1	13.3	0.538317859	35.4	0.02	24.3	0.02
Lead	13.669	0.0072	0.098415	0.000696	1.02	0.000709629	2.659	36.34520625	100	0.2498	9.07903252	1	13.3	0.690087004	80	0.01	8	0.09
Manganese	744.750	0.0072	5.3622	0.0944	1.02	0.096288	0.079	58.83525	100	0.2498	14.6970455	1	13.3	1.515453643	268	0.01	83	0.02
Molybdenum	2.030	0.0072	0.014616	NM	1.02	N/A	1	2.03	100	0.2498	0.507094	1	13.3	0.039226316	1.9	0.02	0.19	0.21
Nickel	12.581	0.0072	0.090585	0.0259	1.02	0.026418291	1.143	14.38036875	100	0.2498	3.59221611	1	13.3	0.278888677	42.1	0.01	23.1	0.01
Selenium	0.095	0.0072	0.000684	0.0005	1.02	0.00051	1.754	0.16663	100	0.2498	0.04162417	1	13.3	0.003219412	0.25	0.01	0.025	0.13
Thallium	0.167	0.0072	0.0012	0.0015	1.02	0.00153	0.123	0.0205	100	0.2498	0.0051209	1	13.3	0.000590293	0.74	0.00	0.074	0.01
Uranium	32.048	0.0072	0.230748	0.0505	1.02	0.05151	1	32.04833333	100	0.2498	8.00567367	1	13.3	0.623152757	5	0.12	0.5	**1.25**
Vanadium	25.706	0.0072	0.185085	0.001365	1.02	0.001391981	0.019	0.48841875	100	0.2498	0.122007	1	13.3	0.023194285	2.1	0.01	0.21	0.11
Zinc	52.363	0.0072	0.37701	0.029735	1.02	0.030329838	16.364	856.85995	100	0.2498	214.043616	1	13.3	16.12413198	225	0.07	22.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 23. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00529			0.73				100	0.18371		1	9.2					
Arsenic	16.350	0.00529	0.0864915	0.0025	0.73	0.001825	0.071	1.16085	100	0.18371	0.21325975	1	9.2	0.032780028	9.63	0.00	1.91	0.02
Cadmium	0.381	0.00529	0.002015159	0.00088	0.73	0.000642597	69.561	26.49839344	100	0.18371	4.86801986	1	9.2	0.52942148	2.3	0.23	0.23	**2.30**
Chromium	12.813	0.00529	0.067778125	0.002039	0.73	0.001488574	0.8	10.25	100	0.18371	1.8830275	1	9.2	0.212205891	56.8	0.00	5.68	0.04
Cobalt	8.806	0.00529	0.046585063	0.000766	0.73	0.000558906	0.18	1.585125	100	0.18371	0.29120331	1	9.2	0.036776879	20	0.00	5	0.01
Copper	20.075	0.00529	0.10619675	0.0044	0.73	0.003212	1.398	28.06485	100	0.18371	5.15579359	1	9.2	0.572304603	35.4	0.02	24.3	0.02
Lead	13.669	0.00529	0.072307688	0.000696	0.73	0.000507871	2.659	36.34520625	100	0.18371	6.67697784	1	9.2	0.733673196	80	0.01	8	0.09
Manganese	744.750	0.00529	3.9397275	0.0944	0.73	0.068912	0.079	58.83525	100	0.18371	10.8086238	1	9.2	1.610572095	268	0.01	83	0.02
Molybdenum	2.030	0.00529	0.0107387	0	0.73	N/A	1	2.03	100	0.18371	0.3729313	1	9.2	0.041703261	1.9	0.02	0.19	0.22
Nickel	12.581	0.00529	0.066554813	0.0259	0.73	0.018907209	1.143	14.38036875	100	0.18371	2.64181754	1	9.2	0.296443431	42.1	0.01	23.1	0.01
Selenium	0.095	0.00529	0.00050255	0.0005	0.73	0.000365	1.754	0.16663	100	0.18371	0.0306116	1	9.2	0.003421646	0.25	0.01	0.025	0.14
Thallium	0.167	0.00529	0.000881667	0.0015	0.73	0.001095	0.123	0.0205	100	0.18371	0.00376606	1	9.2	0.000624209	0.74	0.00	0.074	0.01
Uranium	32.048	0.00529	0.169535683	0.0505	0.73	0.036865	1	32.04833333	100	0.18371	5.88759932	1	9.2	0.662391304	5	0.13	0.5	**1.32**
Vanadium	25.706	0.00529	0.135986063	0.001365	0.73	0.000996222	0.019	0.48841875	100	0.18371	0.08972741	1	9.2	0.024642358	2.1	0.01	0.21	0.12
Zinc	52.363	0.00529	0.276997625	0.029735	0.73	0.021706649	16.364	856.85995	100	0.18371	157.413741	1	9.2	17.14265714	225	0.08	22.5	0.76

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 23. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231				100	0.002835		1	0.00428					
Arsenic	16.350	0.000155	0.00253425	0.0025	0.00231	0.000005775	0.925	15.12375	100	0.002835	0.0428758	1	0.00428	10.61118137	9.63	**1.10**	1.91	**5.56**
Cadmium	0.381	0.000155	5.90453E-05	0.00088	0.00231	2.03342E-06	190	72.378125	100	0.002835	0.205192	1	0.00428	47.95632316	2.3	**20.85**	0.23	**208.51**
Chromium	12.813	0.000155	0.001985938	0.002039	0.00231	4.71042E-06	11.416	146.2675	100	0.002835	0.4146684	1	0.00428	97.35023608	56.8	**1.71**	5.68	**17.14**
Cobalt	8.806	0.000155	0.001364969	0.000766	0.00231	1.76859E-06	0.321	2.82680625	100	0.002835	0.008014	1	0.00428	2.191760061	20	0.11	5	0.44
Copper	20.075	0.000155	0.003111625	0.0044	0.00231	0.000010164	5.492	110.2519	100	0.002835	0.3125641	1	0.00428	73.75839381	35.4	**2.08**	24.3	**3.04**
Lead	13.669	0.000155	0.002118656	0.000696	0.00231	1.6071E-06	228.261	3120.04254	100	0.002835	8.8453206	1	0.00428	2067.159083	80	**25.84**	8	**258.39**
Manganese	744.750	0.000155	0.11543625	0.0944	0.00231	0.000218064	0.228	169.803	100	0.002835	0.4813915	1	0.00428	139.4966867	268	0.52	83	**1.68**
Molybdenum	2.030	0.000155	0.00031465	NM	0.00231	N/A	2.091	4.24473	100	0.002835	0.0120338	1	0.00428	2.8851541	1.9	**1.52**	0.19	**15.19**
Nickel	12.581	0.000155	0.001950094	0.0259	0.00231	5.98297E-05	7.802	98.1589125	100	0.002835	0.2782805	1	0.00428	65.48842064	42.1	**1.56**	23.1	**2.83**
Selenium	0.095	0.000155	0.000014725	0.0005	0.00231	0.000001155	13.733	1.304635	100	0.002835	0.0036986	1	0.00428	0.867878557	0.25	**3.47**	0.025	**34.72**
Thallium	0.167	0.000155	2.58333E-05	0.0015	0.00231	0.000003465	1	0.16666667	100	0.002835	0.0004725	1	0.00428	0.117242601	0.74	0.16	0.074	**1.58**
Uranium	32.048	0.000155	0.004967492	0.0505	0.00231	0.000116655	0.063	2.019045	100	0.002835	0.005724	1	0.00428	2.525266178	5	0.51	0.5	**5.05**
Vanadium	25.706	0.000155	0.003984469	0.001365	0.00231	3.15243E-06	0.088	2.26215	100	0.002835	0.0064132	1	0.00428	2.430097296	2.1	**1.16**	0.21	**11.57**
Zinc	52.363	0.000155	0.008116188	0.029735	0.00231	6.86882E-05	49.51	2592.46738	100	0.002835	7.349645	1	0.00428	1719.119132	225	**7.64**	22.5	**76.41**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 23. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: East Haul Road; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000317			0.00229			58		42	0.003183		1	0.0185					
Arsenic	16.350	0.000317	0.00518295	0.0025	0.00229	0.000005725	4	58	2.1	42	0.003183	0.01019197	1	0.0185	0.831386	9.63	0.09	1.91	0.44
Cadmium	0.381	0.000317	0.000120757	0.00088	0.00229	2.01582E-06	2.1	58	1.3	42	0.003183	0.00561481	1	0.0185	0.31013973	2.3	0.13	0.23	**1.35**
Chromium	12.813	0.000317	0.004061563	0.002039	0.00229	4.66964E-06	0.7	58	2.2	42	0.003183	0.00423339	1	0.0185	0.448628224	56.8	0.01	5.68	0.08
Cobalt	8.806	0.000317	0.002791581	0.000766	0.00229	1.75328E-06	0.3	58	1.26	42	0.003183	0.00223829	1	0.0185	0.271979467	20	0.01	5	0.05
Copper	20.075	0.000317	0.006363775	0.0044	0.00229	0.000010076	5	58	69.1	42	0.003183	0.10160773	1	0.0185	5.836842	35.4	0.16	24.3	0.24
Lead	13.669	0.000317	0.004332994	0.000696	0.00229	1.59319E-06	0.5	58	3.5	42	0.003183	0.00560208	1	0.0185	0.537117132	80	0.01	8	0.07
Manganese	744.750	0.000317	0.23608575	0.0944	0.00229	0.000216176	610	58	108	42	0.003183	1.27052628	1	0.0185	81.4501733	268	0.30	83	0.98
Molybdenum	2.030	0.000317	0.00064351	NM	0.00229	N/A	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	1.9	N/A	0.19	N/A
Nickel	12.581	0.000317	0.003988256	0.0259	0.00229	5.93117E-05	5	58	2	42	0.003183	0.01190442	1	0.0185	0.862269616	42.1	0.02	23.1	0.04
Selenium	0.095	0.000317	0.000030115	0.0005	0.00229	0.000001145	0.05	58	0.3	42	0.003183	0.00049337	1	0.0185	0.028358108	0.25	0.11	0.025	**1.13**
Thallium	0.167	0.000317	5.28333E-05	0.0015	0.00229	0.000003435	0.05	58	0.1	42	0.003183	0.00022599	1	0.0185	0.015257369	0.74	0.02	0.074	0.21
Uranium	32.048	0.000317	0.010159322	0.0505	0.00229	0.000115645	4.381676	58	7.52	42	0.003183	0.01814237	1	0.0185	1.536072497	5	0.31	0.5	**3.07**
Vanadium	25.706	0.000317	0.008148881	0.001365	0.00229	3.12513E-06	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	2.1	N/A	0.21	N/A
Zinc	52.363	0.000317	0.016598913	0.029735	0.00229	6.80935E-05	40	58	152	42	0.003183	0.27704832	1	0.0185	15.87650411	225	0.07	22.5	0.71

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 19. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000142			0.00473			100	0.0148858		1	0.0231					
Arsenic	17	0.0000142	0.0002414	0.0111333	0.00473	5.26607E-05	2.1	100	0.0148858	0.03126018	1	0.0231	1.365984444	22.8	0.06	5.7	0.24
Cadmium	0.26	0.0000142	0.000003692	0.0434231	0.00473	0.000205391	1.3	100	0.0148858	0.01935154	1	0.0231	0.846780223	3.4	0.25	0.85	1.00
Chromium	16.5	0.0000142	0.0002343	0.0081833	0.00473	3.87072E-05	2.2	100	0.0148858	0.03274876	1	0.0231	1.42951373	5	0.29	1	**1.43**
Cobalt	11.5	0.0000142	0.0001633	1.004	0.00473	0.00474892	1.26	100	0.0148858	0.018756108	1	0.0231	1.024602944	43.9	0.02	23.1	0.04
Copper	25.6	0.0000142	0.00036352	0.3128462	0.00473	0.001479762	69.1	100	0.0148858	1.02860878	1	0.0231	44.60831439	33.2	**1.34**	26.9	**1.66**
Lead	16	0.0000142	0.0002272	0.0118	0.00473	0.000055814	3.5	100	0.0148858	0.0521003	1	0.0231	2.267675931	15	0.15	1.5	**1.51**
Manganese	824	0.0000142	0.0117008	88.253	0.00473	0.41743669	108	100	0.0148858	1.6076664	1	0.0231	88.17332857	9770	0.01	977	0.09
Molybdenum	10.05	0.0000142	0.00014271	NM	0.00473	N/A	NM	100	0.0148858	N/A	1	0.0231	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.0000142	0.0002272	1.553	0.00473	0.00734569	2	100	0.0148858	0.0297716	1	0.0231	1.616644589	79	0.02	57.2	0.03
Selenium	4	0.0000142	0.0000568	0.0147333	0.00473	6.96887E-05	0.3	100	0.0148858	0.00446574	1	0.0231	0.198797778	0.8	0.25	0.4	0.50
Thallium	0.37	0.0000142	0.000005254	0.0014917	0.00473	7.05558E-06	0.1	100	0.0148858	0.00148858	1	0.0231	0.064973575	1.2	0.05	0.12	0.54
Uranium	81.4	0.0000142	0.00115588	17.554	0.00473	0.08303042	7.52	100	0.0148858	0.111941216	1	0.0231	8.490368658	1600	0.01	160	0.05
Vanadium	28.2	0.0000142	0.00040044	0.0005	0.00473	0.000002365	NM	100	0.0148858	N/A	1	0.0231	N/A	114	N/A	11.4	N/A
Zinc	52	0.0000142	0.0007384	3.539	0.00473	0.01673947	152	100	0.0148858	2.2626416	1	0.0231	98.70647056	223.5	0.44	10.5	**9.40**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 19. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			60		40	0.004914		1	0.0218					
Arsenic	17	0.000256	0.004352	0.0111333	0.0045	5.01E-05	4	60	2.1	40	0.004914	0.01592136	1	0.0218	0.932268807	22.8	0.04	5.7	0.16
Cadmium	0.26	0.000256	0.00006656	0.0434231	0.0045	0.000195404	2.1	60	1.3	40	0.004914	0.00874692	1	0.0218	0.413251553	3.4	0.12	0.85	0.49
Chromium	16.5	0.000256	0.004224	0.0081833	0.0045	3.6825E-05	0.7	60	2.2	40	0.004914	0.0063882	1	0.0218	0.488487385	5	0.10	1	0.49
Cobalt	11.5	0.000256	0.002944	1.004	0.0045	0.004518	0.3	60	1.26	40	0.004914	0.003361176	1	0.0218	0.496475963	43.9	0.01	23.1	0.02
Copper	25.6	0.000256	0.0065536	0.3128462	0.0045	0.001407808	5	60	69.1	40	0.004914	0.15056496	1	0.0218	7.271851729	33.2	0.22	26.9	0.27
Lead	16	0.000256	0.004096	0.0118	0.0045	0.0000531	0.5	60	3.5	40	0.004914	0.0083538	1	0.0218	0.573527523	15	0.04	1.5	0.38
Manganese	824	0.000256	0.210944	88.253	0.0045	0.3971385	610	60	108	40	0.004914	2.0108088	1	0.0218	120.1326284	9770	0.01	977	0.12
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.000256	0.004096	1.553	0.0045	0.0069885	5	60	2	40	0.004914	0.0186732	1	0.0218	1.36503211	79	0.02	57.2	0.02
Selenium	4	0.000256	0.001024	0.0147333	0.0045	6.63E-05	0.05	60	0.3	40	0.004914	0.0007371	1	0.0218	0.083825688	0.8	0.10	0.4	0.21
Thallium	0.37	0.000256	0.00009472	0.0014917	0.0045	6.7125E-06	0.05	60	0.1	40	0.004914	0.00034398	1	0.0218	0.020431766	1.2	0.02	0.12	0.17
Uranium	81.4	0.000256	0.0208384	17.554	0.0045	0.078993	4.381676	60	7.52	40	0.004914	0.027700246	1	0.0218	5.850075482	1,600	0.00	160	0.04
Vanadium	28.2	0.000256	0.0072192	0.0005	0.0045	0.00000225	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	52	0.000256	0.013312	3.539	0.0045	0.0159255	40	60	152	40	0.004914	0.4167072	1	0.0218	20.4561789	223.5	0.09	10.5	**1.95**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 19. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			100	0.004914		1	0.0218					
Arsenic	17	0.000256	0.004352	0.011133	0.0045	5.01E-05	4	100	0.004914	0.019656	1	0.0218	1.103582569	22.8	0.05	5.7	0.19
Cadmium	0.26	0.000256	0.00006656	0.043423	0.0045	0.000195404	2.1	100	0.004914	0.0103194	1	0.0218	0.485383663	3.4	0.14	0.85	0.57
Chromium	16.5	0.000256	0.004224	0.008183	0.0045	3.6825E-05	0.7	100	0.004914	0.0034398	1	0.0218	0.353239679	5	0.07	1	0.35
Cobalt	11.5	0.000256	0.002944	1.004	0.0045	0.004518	0.3	100	0.004914	0.0014742	1	0.0218	0.409917431	43.9	0.01	23.1	0.02
Copper	25.6	0.000256	0.0065536	0.312846	0.0045	0.001407808	5	100	0.004914	0.02457	1	0.0218	1.492266408	33.2	0.04	26.9	0.06
Lead	16	0.000256	0.004096	0.0118	0.0045	0.0000531	0.5	100	0.004914	0.002457	1	0.0218	0.30303211	15	0.02	1.5	0.20
Manganese	824	0.000256	0.210944	88.253	0.0045	0.3971385	610	100	0.004914	2.99754	1	0.0218	165.3955275	9770	0.02	977	0.17
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	NM	100	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.000256	0.004096	1.553	0.0045	0.0069885	5	100	0.004914	0.02457	1	0.0218	1.635527523	79	0.02	57.2	0.03
Selenium	4	0.000256	0.001024	0.014733	0.0045	6.63E-05	0.05	100	0.004914	0.0002457	1	0.0218	0.061284404	0.8	0.08	0.4	0.15
Thallium	0.37	0.000256	0.00009472	0.001492	0.0045	6.7125E-06	0.05	100	0.004914	0.0002457	1	0.0218	0.015923509	1.2	0.01	0.12	0.13
Uranium	81.4	0.000256	0.0208384	17.554	0.0045	0.078993	4.381676	100	0.004914	0.0215316	1	0.0218	5.567108067	1600	0.00	160	0.03
Vanadium	28.2	0.000256	0.0072192	0.0005	0.0045	0.00000225	NM	100	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	52	0.000256	0.013312	3.539	0.0045	0.0159255	40	100	0.004914	0.19656	1	0.0218	10.35768349	223.5	0.05	10.5	0.99

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 19. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014				100	0.00792		1	0.117					
Arsenic	17	0.00038	0.00646	0.011133	0.014	0.000155867	0.071	1.207	100	0.00792	0.00955944	1	0.117	0.138250484	22.8	0.01	5.7	0.02
Cadmium	0.26	0.00038	0.0000988	0.043423	0.014	0.000607923	69.561	18.08586	100	0.00792	0.14324001	1	0.117	1.230313968	3.4	0.36	0.85	**1.45**
Chromium	16.5	0.00038	0.00627	0.008183	0.014	0.000114567	0.8	13.2	100	0.00792	0.104544	1	0.117	0.948107407	5	0.19	1	0.95
Cobalt	11.5	0.00038	0.00437	1.004	0.014	0.014056	0.18	2.07	100	0.00792	0.0163944	1	0.117	0.297610256	43.9	0.01	23.1	0.01
Copper	25.6	0.00038	0.009728	0.312846	0.014	0.004379846	1.398	35.7888	100	0.00792	0.2834473	1	0.117	2.543206343	33.2	0.08	26.9	0.09
Lead	16	0.00038	0.00608	0.0118	0.014	0.0001652	2.659	42.544	100	0.00792	0.33694848	1	0.117	2.933279316	15	0.20	1.5	**1.96**
Manganese	824	0.00038	0.31312	88.253	0.014	1.235542	0.079	65.096	100	0.00792	0.51556032	1	0.117	17.64292581	9770	0.00	977	0.02
Molybdenum	10.05	0.00038	0.003819	NM	0.014	N/A	1	10.05	100	0.00792	0.079596	1	0.117	0.712948718	35.5	0.02	3.55	0.20
Nickel	16	0.00038	0.00608	1.553	0.014	0.021742	1.143	18.288	100	0.00792	0.14484096	1	0.117	1.475751795	79	0.02	57.2	0.03
Selenium	4	0.00038	0.00152	0.014733	0.014	0.000206267	1.754	7.016	100	0.00792	0.05556672	1	0.117	0.489683647	0.8	0.61	0.4	**1.22**
Thallium	0.37	0.00038	0.0001406	0.001492	0.014	2.08833E-05	0.123	0.04551	100	0.00792	0.00036044	1	0.117	0.004460876	1.2	0.00	0.12	0.04
Uranium	81.4	0.00038	0.030932	17.554	0.014	0.245756	1	81.4	100	0.00792	0.644688	1	0.117	7.875008547	1600	0.00	160	0.05
Vanadium	28.2	0.00038	0.010716	0.0005	0.014	0.000007	0.019	0.5358	100	0.00792	0.00424354	1	0.117	0.127919111	114	0.00	11.4	0.01
Zinc	52	0.00038	0.01976	3.539	0.014	0.049546	16.364	850.928	100	0.00792	6.73934976	1	0.117	58.19363897	223.5	0.26	10.5	**5.54**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 19. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00151			0.075				100	0.03129		1	1.436					
Arsenic	17	0.00151	0.02567	0.011133	0.075	0.000835	0.071	1.207	100	0.03129	0.03776703	1	1.436	0.044757681	22.8	0.00	5.7	0.01
Cadmium	0.26	0.00151	0.0003926	0.043423	0.075	0.003256731	69.561	18.08586	100	0.03129	0.56590656	1	1.436	0.396626664	3.4	0.12	0.85	0.47
Chromium	16.5	0.00151	0.024915	0.008183	0.075	0.00061375	0.8	13.2	100	0.03129	0.413028	1	1.436	0.305401636	5	0.06	1	0.31
Cobalt	11.5	0.00151	0.017365	1.004	0.075	0.0753	0.18	2.07	100	0.03129	0.0647703	1	1.436	0.10963461	43.9	0.00	23.1	0.00
Copper	25.6	0.00151	0.038656	0.312846	0.075	0.023463462	1.398	35.7888	100	0.03129	1.11983155	1	1.436	0.823085664	33.2	0.02	26.9	0.03
Lead	16	0.00151	0.02416	0.0118	0.075	0.000885	2.659	42.544	100	0.03129	1.33120176	1	1.436	0.944461532	15	0.06	1.5	0.63
Manganese	824	0.00151	1.24424	88.253	0.075	6.618975	0.079	65.096	100	0.03129	2.03685384	1	1.436	6.894198357	9770	0.00	977	0.01
Molybdenum	10.05	0.00151	0.0151755	NM	0.075	N/A	1	10.05	100	0.03129	0.3144645	1	1.436	0.229554318	35.5	0.01	3.55	0.06
Nickel	16	0.00151	0.02416	1.553	0.075	0.116475	1.143	18.288	100	0.03129	0.57223152	1	1.436	0.496425153	79	0.01	57.2	0.01
Selenium	4	0.00151	0.00604	0.014733	0.075	0.001105	1.754	7.016	100	0.03129	0.21953064	1	1.436	0.157852117	0.8	0.20	0.4	0.39
Thallium	0.37	0.00151	0.0005587	0.001492	0.075	0.000111875	0.123	0.04551	100	0.03129	0.00142401	1	1.436	0.001458623	1.2	0.00	0.12	0.01
Uranium	81.4	0.00151	0.122914	17.554	0.075	1.31655	1	81.4	100	0.03129	2.547006	1	1.436	2.776093315	1600	0.00	160	0.02
Vanadium	28.2	0.00151	0.042582	0.0005	0.075	0.0000375	0.019	0.5358	100	0.03129	0.01676518	1	1.436	0.041354235	114	0.00	11.4	0.00
Zinc	52	0.00151	0.07852	3.539	0.075	0.265425	16.364	850.928	100	0.03129	26.6255371	1	1.436	18.78097641	223.5	0.08	10.5	**1.79**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 19. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00213			0.038			100	0.02077		1	0.515					
Arsenic	17	0.00213	0.03621	0.011133	0.038	0.000423067	4	100	0.02077	0.08308	1	0.515	0.232452557	22.8	0.01	5.7	0.04
Cadmium	0.26	0.00213	0.0005538	0.043423	0.038	0.001650077	2.1	100	0.02077	0.043617	1	0.515	0.088972577	3.4	0.03	0.85	0.10
Chromium	16.5	0.00213	0.035145	0.008183	0.038	0.000310967	0.7	100	0.02077	0.014539	1	0.515	0.097077605	5	0.02	1	0.10
Cobalt	11.5	0.00213	0.024495	1.004	0.038	0.038152	0.3	100	0.02077	0.006231	1	0.515	0.133743689	43.9	0.00	23.1	0.01
Copper	25.6	0.00213	0.054528	0.312846	0.038	0.011888154	5	100	0.02077	0.10385	1	0.515	0.330613891	33.2	0.01	26.9	0.01
Lead	16	0.00213	0.03408	0.0118	0.038	0.0004484	0.5	100	0.02077	0.010385	1	0.515	0.087210485	15	0.01	1.5	0.06
Manganese	824	0.00213	1.75512	88.253	0.038	3.353614	610	100	0.02077	12.6697	1	0.515	34.52123107	9770	0.00	977	0.04
Molybdenum	10.05	0.00213	0.0214065	NM	0.038	N/A	NM	100	0.02077	N/A	1	0.515	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.00213	0.03408	1.553	0.038	0.059014	5	100	0.02077	0.10385	1	0.515	0.382415534	79	0.00	57.2	0.01
Selenium	4	0.00213	0.00852	0.014733	0.038	0.000559867	0.05	100	0.02077	0.0010385	1	0.515	0.019647314	0.8	0.02	0.4	0.05
Thallium	0.37	0.00213	0.0007881	0.001492	0.038	5.66833E-05	0.05	100	0.02077	0.0010385	1	0.515	0.003656861	1.2	0.00	0.12	0.03
Uranium	81.4	0.00213	0.173382	17.554	0.038	0.667052	4.381676	100	0.02077	0.0910074	1	0.515	1.808624098	1600	0.00	160	0.01
Vanadium	28.2	0.00213	0.060066	0.0005	0.038	0.000019	NM	100	0.02077	N/A	1	0.515	N/A	114	N/A	11.4	N/A
Zinc	52	0.00213	0.11076	3.539	0.038	0.134482	40	100	0.02077	0.8308	1	0.515	2.089401942	223.5	0.01	10.5	0.20

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 19. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0106				100	0.006236		1	0.0771					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000724	0.012308	0.011133	0.0106	0.000118013	0.925	15.725	100	0.006236	0.0980611	1	0.0771	1.433036489	22.8	0.06	5.7	0.25
Cadmium	0.26	0.000724	0.00018824	0.043423	0.0106	0.000460285	190	49.4	100	0.006236	0.3080584	1	0.0771	4.003980864	3.4	**1.18**	0.85	**4.71**
Chromium	16.5	0.000724	0.011946	0.008183	0.0106	8.67433E-05	11.416	188.364	100	0.006236	1.1746379	1	0.0771	15.39131838	5	**3.08**	1	**15.39**
Cobalt	11.5	0.000724	0.008326	1.004	0.0106	0.0106424	0.321	3.6915	100	0.006236	0.0230202	1	0.0771	0.544599144	43.9	0.01	23.1	0.02
Copper	25.6	0.000724	0.0185344	0.312846	0.0106	0.003316169	5.492	140.5952	100	0.006236	0.8767517	1	0.0771	11.65502252	33.2	0.35	26.9	0.43
Lead	16	0.000724	0.011584	0.0118	0.0106	0.00012508	228.261	3652.176	100	0.006236	22.77497	1	0.0771	295.5470638	15	**19.70**	1.5	**197.03**
Manganese	824	0.000724	0.596576	88.253	0.0106	0.9354818	0.228	187.872	100	0.006236	1.1715698	1	0.0771	35.06650573	9770	0.00	977	0.04
Molybdenum	10.05	0.000724	0.0072762	NM	0.0106	N/A	2.091	21.01455	100	0.006236	0.1310467	1	0.0771	1.794071774	35.5	0.05	3.55	0.51
Nickel	16	0.000724	0.011584	1.553	0.0106	0.0164618	7.802	124.832	100	0.006236	0.7784524	1	0.0771	10.46041702	79	0.13	57.2	0.18
Selenium	4	0.000724	0.002896	0.014733	0.0106	0.000156173	13.733	54.932	100	0.006236	0.342556	1	0.0771	4.482595659	0.8	**5.60**	0.4	**11.21**
Thallium	0.37	0.000724	0.00026788	0.001492	0.0106	1.58117E-05	1	0.37	100	0.006236	0.0023073	1	0.0771	0.033605858	1.2	0.03	0.12	0.28
Uranium	81.4	0.000724	0.0589336	17.554	0.0106	0.1860724	0.063	5.1282	100	0.006236	0.0319795	1	0.0771	3.592548057	1600	0.00	160	0.02
Vanadium	28.2	0.000724	0.0204168	0.0005	0.0106	0.0000053	0.088	2.4816	100	0.006236	0.0154753	1	0.0771	0.465594781	114	0.00	11.4	0.04
Zinc	52	0.000724	0.037648	3.539	0.0106	0.0375134	49.51	2574.52	100	0.006236	16.054707	1	0.0771	209.2071092	223.5	0.94	10.5	**19.92**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 25. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000111	0.001887	0.011133	0.0061	6.79133E-05	19	100	0.004929	0.093651	1	0.0394	2.426546024	9.63	0.25	1.91	**1.27**
Cadmium	0.26	0.000111	0.00002886	0.043423	0.0061	0.000264881	4	100	0.004929	0.019716	1	0.0394	0.507861441	2.3	0.22	0.23	**2.21**
Chromium	16.5	0.000111	0.0018315	0.008183	0.0061	4.99183E-05	16	100	0.004929	0.078864	1	0.0394	2.0493761	56.8	0.04	5.68	0.36
Cobalt	11.5	0.000111	0.0012765	1.004	0.0061	0.0061244	15	100	0.004929	0.073935	1	0.0394	2.064362944	20	0.10	5	0.41
Copper	25.6	0.000111	0.0028416	0.312846	0.0061	0.001908362	116	100	0.004929	0.571764	1	0.0394	14.63233405	35.4	0.41	24.3	0.60
Lead	16	0.000111	0.001776	0.0118	0.0061	0.00007198	37.9	100	0.004929	0.1868091	1	0.0394	4.788250761	80	0.06	8	0.60
Manganese	824	0.000111	0.091464	88.253	0.0061	0.5383433	1420	100	0.004929	6.99918	1	0.0394	193.6291193	268	0.72	83	**2.33**
Molybdenum	10.05	0.000111	0.00111555	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.000111	0.001776	1.553	0.0061	0.0094733	26	100	0.004929	0.128154	1	0.0394	3.538154822	42.1	0.08	23.1	0.15
Selenium	4	0.000111	0.000444	0.014733	0.0061	8.98733E-05	0.5	100	0.004929	0.0024645	1	0.0394	0.076100846	0.25	0.30	0.025	**3.04**
Thallium	0.37	0.000111	0.00004107	0.001492	0.0061	9.09917E-06	0.4	100	0.004929	0.0019716	1	0.0394	0.051313938	0.74	0.07	0.074	0.69
Uranium	81.4	0.000111	0.0090354	17.554	0.0061	0.1070794	876.09	100	0.004929	4.3182427	1	0.0394	112.5471454	5	**22.51**	0.5	**225.09**
Vanadium	28.2	0.000111	0.0031302	0.0005	0.0061	0.00000305	0	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.000111	0.005772	3.539	0.0061	0.0215879	147	100	0.004929	0.724563	1	0.0394	19.08433756	225	0.08	22.5	0.85

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 31. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	17	0.000111	0.001887	0.011133	0.0061	6.79133E-05	4	100	0.004929	0.019716	1	0.0394	0.550023181	9.63	0.06	1.91	0.29
Cadmium	0.26	0.000111	0.00002886	0.043423	0.0061	0.000264881	2.1	100	0.004929	0.0103509	1	0.0394	0.270168547	2.3	0.12	0.23	**1.17**
Chromium	16.5	0.000111	0.0018315	0.008183	0.0061	4.99183E-05	0.7	100	0.004929	0.0034503	1	0.0394	0.1353228	56.8	0.00	5.68	0.02
Cobalt	11.5	0.000111	0.0012765	1.004	0.0061	0.0061244	0.3	100	0.004929	0.0014787	1	0.0394	0.225370558	20	0.01	5	0.05
Copper	25.6	0.000111	0.0028416	0.312846	0.0061	0.001908362	5	100	0.004929	0.024645	1	0.0394	0.746065014	35.4	0.02	24.3	0.03
Lead	16	0.000111	0.001776	0.0118	0.0061	0.00007198	0.5	100	0.004929	0.0024645	1	0.0394	0.109453807	80	0.00	8	0.01
Manganese	824	0.000111	0.091464	88.253	0.0061	0.5383433	610	100	0.004929	3.00669	1	0.0394	92.29688579	268	0.34	83	**1.11**
Molybdenum	10.05	0.000111	0.00111555	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.000111	0.001776	1.553	0.0061	0.0094733	5	100	0.004929	0.024645	1	0.0394	0.911022843	42.1	0.02	23.1	0.04
Selenium	4	0.000111	0.000444	0.014733	0.0061	8.98733E-05	0.05	100	0.004929	0.0002465	1	0.0394	0.019805161	0.25	0.08	0.025	0.79
Thallium	0.37	0.000111	0.00004107	0.001492	0.0061	9.09917E-06	0.05	100	0.004929	0.0002465	1	0.0394	0.007528405	0.74	0.01	0.074	0.10
Uranium	81.4	0.000111	0.0090354	17.554	0.0061	0.1070794	4.38	100	0.004929	0.0215973	1	0.0394	3.495230482	5	0.70	0.5	**6.99**
Vanadium	28.2	0.000111	0.0031302	0.0005	0.0061	0.00000305	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.000111	0.005772	3.539	0.0061	0.0215879	40	100	0.004929	0.19716	1	0.0394	5.698474619	225	0.03	22.5	0.25

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 19. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.083			3.61			100	1.517		1	68.6					
Arsenic	17	0.083	1.411	0.011133	3.61	0.040191333	4	100	1.517	6.068	1	68.6	0.109609203	9.63	0.01	1.91	0.06
Cadmium	0.26	0.083	0.02158	0.043423	3.61	0.156757308	2.1	100	1.517	3.1857	1	68.6	0.049038445	2.3	0.02	0.23	0.21
Chromium	16.5	0.083	1.3695	0.008183	3.61	0.029541833	0.7	100	1.517	1.0619	1	68.6	0.035873788	56.8	0.00	5.68	0.01
Cobalt	11.5	0.083	0.9545	1.004	3.61	3.62444	0.3	100	1.517	0.4551	1	68.6	0.073382507	20	0.00	5	0.01
Copper	25.6	0.083	2.1248	0.312846	3.61	1.129374615	5	100	1.517	7.585	1	68.6	0.158005461	35.4	0.00	24.3	0.01
Lead	16	0.083	1.328	0.0118	3.61	0.042598	0.5	100	1.517	0.7585	1	68.6	0.031036414	80	0.00	8	0.00
Manganese	824	0.083	68.392	88.253	3.61	318.59333	610	100	1.517	925.37	1	68.6	19.13054417	268	0.07	83	0.23
Molybdenum	10.05	0.083	0.83415	NM	3.61	N/A	NM	100	1.517	N/A	1	68.6	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.083	1.328	1.553	3.61	5.60633	5	100	1.517	7.585	1	68.6	0.211652041	42.1	0.01	23.1	0.01
Selenium	4	0.083	0.332	0.014733	3.61	0.053187333	0.05	100	1.517	0.07585	1	68.6	0.006720661	0.25	0.03	0.025	0.27
Thallium	0.37	0.083	0.03071	0.001492	3.61	0.005384917	0.05	100	1.517	0.07585	1	68.6	0.00163185	0.74	0.00	0.074	0.02
Uranium	81.4	0.083	6.7562	17.554	3.61	63.36994	4.381676	100	1.517	6.6470025	1	68.6	1.119142019	5	0.22	0.5	**2.24**
Vanadium	28.2	0.083	2.3406	0.0005	3.61	0.001805	NM	100	1.517	N/A	1	68.6	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.083	4.316	3.539	3.61	12.77579	40	100	1.517	60.68	1	68.6	1.133699563	225	0.01	22.5	0.05

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 19. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0072			1.02				100	0.2498		1	13.3					
Arsenic	17	0.0072	0.1224	0.011133	1.02	0.011356	0.071	1.207	100	0.2498	0.3015086	1	13.3	0.032726662	9.63	0.00	1.91	0.02
Cadmium	0.26	0.0072	0.001872	0.043423	1.02	0.044291538	69.561	18.08586	100	0.2498	4.51784783	1	13.3	0.343158749	2.3	0.15	0.23	**1.49**
Chromium	16.5	0.0072	0.1188	0.008183	1.02	0.008347	0.8	13.2	100	0.2498	3.29736	1	13.3	0.257481729	56.8	0.00	5.68	0.05
Cobalt	11.5	0.0072	0.0828	1.004	1.02	1.02408	0.18	2.07	100	0.2498	0.517086	1	13.3	0.122102707	20	0.01	5	0.02
Copper	25.6	0.0072	0.18432	0.312846	1.02	0.319103077	1.398	35.7888	100	0.2498	8.94004224	1	13.3	0.710034986	35.4	0.02	24.3	0.03
Lead	16	0.0072	0.1152	0.0118	1.02	0.012036	2.659	42.544	100	0.2498	10.6274912	1	13.3	0.808626105	80	0.01	8	0.10
Manganese	824	0.0072	5.9328	88.253	1.02	90.01806	0.079	65.096	100	0.2498	16.2609808	1	13.3	8.436980511	268	0.03	83	0.10
Molybdenum	10.05	0.0072	0.07236	NM	1.02	N/A	1	10.05	100	0.2498	2.51049	1	13.3	0.194199248	1.9	0.10	0.19	**1.02**
Nickel	16	0.0072	0.1152	1.553	1.02	1.58406	1.143	18.288	100	0.2498	4.5683424	1	13.3	0.471248301	42.1	0.01	23.1	0.02
Selenium	4	0.0072	0.0288	0.014733	1.02	0.015028	1.754	7.016	100	0.2498	1.7525968	1	13.3	0.135069534	0.25	0.54	0.025	**5.40**
Thallium	0.37	0.0072	0.002664	0.001492	1.02	0.0015215	0.123	0.04551	100	0.2498	0.0113684	1	13.3	0.001169466	0.74	0.00	0.074	0.02
Uranium	81.4	0.0072	0.58608	17.554	1.02	17.90508	1	81.4	100	0.2498	20.33372	1	13.3	2.91916391	5	0.58	0.5	**5.84**
Vanadium	28.2	0.0072	0.20304	0.0005	1.02	0.00051	0.019	0.5358	100	0.2498	0.13384284	1	13.3	0.025367883	2.1	0.01	0.21	0.12
Zinc	52	0.0072	0.3744	3.539	1.02	3.60978	16.364	850.928	100	0.2498	212.561814	1	13.3	16.28165371	225	0.07	22.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 19. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00529			0.73				100	0.18371		1	9.2					
Arsenic	17	0.00529	0.08993	0.011133	0.73	0.008127333	0.071	1.207	100	0.18371	0.22173797	1	9.2	0.034760359	9.63	0.00	1.91	0.02
Cadmium	0.26	0.00529	0.0013754	0.043423	0.73	0.031698846	69.561	18.08586	100	0.18371	3.32255334	1	9.2	0.364742129	2.3	0.16	0.23	**1.59**
Chromium	16.5	0.00529	0.087285	0.008183	0.73	0.005973833	0.8	13.2	100	0.18371	2.424972	1	9.2	0.273720743	56.8	0.00	5.68	0.05
Cobalt	11.5	0.00529	0.060835	1.004	0.73	0.73292	0.18	2.07	100	0.18371	0.3802797	1	9.2	0.127612467	20	0.01	5	0.03
Copper	25.6	0.00529	0.135424	0.312846	0.73	0.228377692	1.398	35.7888	100	0.18371	6.57476045	1	9.2	0.754191537	35.4	0.02	24.3	0.03
Lead	16	0.00529	0.08464	0.0118	0.73	0.008614	2.659	42.544	100	0.18371	7.81575824	1	9.2	0.859675243	80	0.01	8	0.11
Manganese	824	0.00529	4.35896	88.253	0.73	64.42469	0.079	65.096	100	0.18371	11.9587862	1	9.2	8.776351757	268	0.03	83	0.11
Molybdenum	10.05	0.00529	0.0531645	NM	0.73	N/A	1	10.05	100	0.18371	1.8462855	1	9.2	0.206461957	1.9	0.11	0.19	**1.09**
Nickel	16	0.00529	0.08464	1.553	0.73	1.13369	1.143	18.288	100	0.18371	3.35968848	1	9.2	0.497610704	42.1	0.01	23.1	0.02
Selenium	4	0.00529	0.02116	0.014733	0.73	0.010755333	1.754	7.016	100	0.18371	1.28890936	1	9.2	0.143567901	0.25	0.57	0.025	**5.74**
Thallium	0.37	0.00529	0.0019573	0.001492	0.73	0.001088917	0.123	0.04551	100	0.18371	0.00836064	1	9.2	0.001239876	0.74	0.00	0.074	0.02
Uranium	81.4	0.00529	0.430606	17.554	0.73	12.81442	1	81.4	100	0.18371	14.953994	1	9.2	3.06511087	5	0.61	0.5	**6.13**
Vanadium	28.2	0.00529	0.149178	0.0005	0.73	0.000365	0.019	0.5358	100	0.18371	0.09843182	1	9.2	0.026953785	2.1	0.01	0.21	0.13
Zinc	52	0.00529	0.27508	3.539	0.73	2.58347	16.364	850.928	100	0.18371	156.323983	1	9.2	17.30244923	225	0.08	22.5	0.77

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 19. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231				100	0.002835		1	0.00428					
Arsenic	17	0.000155	0.002635	0.011133	0.00231	2.5718E-05	0.925	15.725	100	0.002835	0.0445804	1	0.00428	11.03763855	9.63	**1.15**	1.91	**5.78**
Cadmium	0.26	0.000155	0.0000403	0.043423	0.00231	0.000100307	190	49.4	100	0.002835	0.140049	1	0.00428	32.75458115	2.3	**14.24**	0.23	**142.41**
Chromium	16.5	0.000155	0.0025575	0.008183	0.00231	1.89035E-05	11.416	188.364	100	0.002835	0.5340119	1	0.00428	125.3711083	56.8	**2.21**	5.68	**22.07**
Cobalt	11.5	0.000155	0.0017825	1.004	0.00231	0.00231924	0.321	3.6915	100	0.002835	0.0104654	1	0.00428	3.403537967	20	0.17	5	0.68
Copper	25.6	0.000155	0.003968	0.312846	0.00231	0.000722675	5.492	140.5952	100	0.002835	0.3985874	1	0.00428	94.22384734	35.4	**2.66**	24.3	**3.88**
Lead	16	0.000155	0.00248	0.0118	0.00231	0.000027258	228.261	3652.176	100	0.002835	10.353919	1	0.00428	2419.725752	80	**30.25**	8	**302.47**
Manganese	824	0.000155	0.12772	88.253	0.00231	0.20386443	0.228	187.872	100	0.002835	0.5326171	1	0.00428	201.91625	268	0.75	83	**2.43**
Molybdenum	10.05	0.000155	0.00155775	NM	0.00231	N/A	2.091	21.01455	100	0.002835	0.0595762	1	0.00428	14.28364468	1.9	**7.52**	0.19	**75.18**
Nickel	16	0.000155	0.00248	1.553	0.00231	0.00358743	7.802	124.832	100	0.002835	0.3538987	1	0.00428	84.10424065	42.1	**2.00**	23.1	**3.64**
Selenium	4	0.000155	0.00062	0.014733	0.00231	3.4034E-05	13.733	54.932	100	0.002835	0.1557322	1	0.00428	36.53884439	0.25	**146.16**	0.025	**1461.55**
Thallium	0.37	0.000155	0.00005735	0.001492	0.00231	3.44575E-06	1	0.37	100	0.002835	0.001049	1	0.00428	0.25928639	0.74	0.35	0.074	**3.50**
Uranium	81.4	0.000155	0.012617	17.554	0.00231	0.04054974	0.063	5.1282	100	0.002835	0.0145384	1	0.00428	15.81896893	5	**3.16**	0.5	**31.64**
Vanadium	28.2	0.000155	0.004371	0.0005	0.00231	0.000001155	0.088	2.4816	100	0.002835	0.0070353	1	0.00428	2.665301636	2.1	**1.27**	0.21	**12.69**
Zinc	52	0.000155	0.00806	3.539	0.00231	0.00817509	49.51	2574.52	100	0.002835	7.2987642	1	0.00428	1709.111984	225	**7.60**	22.5	**75.96**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 19. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pit 3
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000317			0.00229			58		42	0.003183		1	0.0185					
Arsenic	17	0.000317	0.005389	0.011133	0.00229	2.54953E-05	4	58	2.1	42	0.003183	0.01019197	1	0.0185	0.843592505	9.63	0.09	1.91	0.44
Cadmium	0.26	0.000317	0.00008242	0.043423	0.00229	9.94388E-05	2.1	58	1.3	42	0.003183	0.00561481	1	0.0185	0.313333559	2.3	0.14	0.23	**1.36**
Chromium	16.5	0.000317	0.0052305	0.008183	0.00229	1.87398E-05	0.7	58	2.2	42	0.003183	0.00423339	1	0.0185	0.512574586	56.8	0.01	5.68	0.09
Cobalt	11.5	0.000317	0.0036455	1.004	0.00229	0.00229916	0.3	58	1.26	42	0.003183	0.00223829	1	0.0185	0.442321384	20	0.02	5	0.09
Copper	25.6	0.000317	0.0081152	0.312846	0.00229	0.000716418	5	58	69.1	42	0.003183	0.10160773	1	0.0185	5.969694254	35.4	0.17	24.3	0.25
Lead	16	0.000317	0.005072	0.0118	0.00229	0.000027022	0.5	58	3.5	42	0.003183	0.00560208	1	0.0185	0.578437946	80	0.01	8	0.07
Manganese	824	0.000317	0.261208	88.253	0.00229	0.20209937	610	58	108	42	0.003183	1.27052628	1	0.0185	93.72073784	268	0.35	83	**1.13**
Molybdenum	10.05	0.000317	0.00318585	NM	0.00229	N/A	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.000317	0.005072	1.553	0.00229	0.00355637	5	58	2	42	0.003183	0.01190442	1	0.0185	1.109880541	42.1	0.03	23.1	0.05
Selenium	4	0.000317	0.001268	0.014733	0.00229	3.37393E-05	0.05	58	0.3	42	0.003183	0.00049337	1	0.0185	0.097032667	0.25	0.39	0.025	**3.88**
Thallium	0.37	0.000317	0.00011729	0.001492	0.00229	3.41592E-06	0.05	58	0.1	42	0.003183	0.00022599	1	0.0185	0.018740482	0.74	0.03	0.074	0.25
Uranium	81.4	0.000317	0.0258038	17.554	0.00229	0.04019866	4.381676	58	7.52	42	0.003183	0.01814237	1	0.0185	4.548369434	5	0.91	0.5	**9.10**
Vanadium	28.2	0.000317	0.0089394	0.0005	0.00229	0.000001145	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.000317	0.016484	3.539	0.00229	0.00810431	40	58	152	42	0.003183	0.27704832	1	0.0185	16.3046827	225	0.07	22.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 20. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000142			0.00473			100	0.0148858		1	0.0231					
Arsenic	17	0.0000142	0.0002414	0.0093778	0.00473	4.43569E-05	2.1	100	0.0148858	0.03126018	1	0.0231	1.365624974	22.8	0.06	5.7	0.24
Cadmium	0.26	0.0000142	0.000003692	0.0445158	0.00473	0.00021056	1.3	100	0.0148858	0.01935154	1	0.0231	0.847003969	3.4	0.25	0.85	1.00
Chromium	16.5	0.0000142	0.0002343	0.0063833	0.00473	3.01932E-05	2.2	100	0.0148858	0.03274876	1	0.0231	1.429145159	5	0.29	1	**1.43**
Cobalt	11.5	0.0000142	0.0001633	1.196	0.00473	0.00565708	1.26	100	0.0148858	0.018756108	1	0.0231	1.063917229	43.9	0.02	23.1	0.05
Copper	25.6	0.0000142	0.00036352	0.2751579	0.00473	0.001301497	69.1	100	0.0148858	1.02860878	1	0.0231	44.60059727	33.2	**1.34**	26.9	**1.66**
Lead	16	0.0000142	0.0002272	0.0045444	0.00473	2.14952E-05	3.5	100	0.0148858	0.0521003	1	0.0231	2.266190269	15	0.15	1.5	**1.51**
Manganese	824	0.0000142	0.0117008	88.963158	0.00473	0.420795737	108	100	0.0148858	1.6076664	1	0.0231	88.31874186	9770	0.01	977	0.09
Molybdenum	10.05	0.0000142	0.00014271	NM	0.00473	N/A	NM	100	0.0148858	N/A	1	0.0231	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.0000142	0.0002272	1.748	0.00473	0.00826804	2	100	0.0148858	0.0297716	1	0.0231	1.65657316	79	0.02	57.2	0.03
Selenium	4	0.0000142	0.0000568	0.0081444	0.00473	3.85232E-05	0.3	100	0.0148858	0.00446574	1	0.0231	0.197448624	0.8	0.25	0.4	0.49
Thallium	0.37	0.0000142	0.000005254	0.00005	0.00473	2.365E-07	0.1	100	0.0148858	0.00148858	1	0.0231	0.064678377	1.2	0.05	0.12	0.54
Uranium	81.4	0.0000142	0.00115588	17.978	0.00473	0.08503594	7.52	100	0.0148858	0.111941216	1	0.0231	8.577187706	1600	0.01	160	0.05
Vanadium	28.2	0.0000142	0.00040044	0.0005	0.00473	0.000002365	NM	100	0.0148858	N/A	1	0.0231	N/A	114	N/A	11.4	N/A
Zinc	52	0.0000142	0.0007384	3.774	0.00473	0.01785102	152	100	0.0148858	2.2626416	1	0.0231	98.75458961	223.5	0.44	10.5	**9.41**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 20. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045			60		40	0.004914		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000256	0.004352	0.0093778	0.0045	4.22E-05	4	60	2.1	40	0.004914	0.01592136	1	0.0218	0.931906422	22.8	0.04	5.7	0.16
Cadmium	0.26	0.000256	0.00006656	0.0445158	0.0045	0.000200321	2.1	60	1.3	40	0.004914	0.00874692	1	0.0218	0.413477113	3.4	0.12	0.85	0.49
Chromium	16.5	0.000256	0.004224	0.0063833	0.0045	2.8725E-05	0.7	60	2.2	40	0.004914	0.0063882	1	0.0218	0.488115826	5	0.10	1	0.49
Cobalt	11.5	0.000256	0.002944	1.196	0.0045	0.005382	0.3	60	1.26	40	0.004914	0.003361176	1	0.0218	0.536108991	43.9	0.01	23.1	0.02
Copper	25.6	0.000256	0.0065536	0.2751579	0.0045	0.001238211	5	60	69.1	40	0.004914	0.15056496	1	0.0218	7.264072042	33.2	0.22	26.9	0.27
Lead	16	0.000256	0.004096	0.0045444	0.0045	2.045E-05	0.5	60	3.5	40	0.004914	0.0083538	1	0.0218	0.572029817	15	0.04	1.5	0.38
Manganese	824	0.000256	0.210944	88.963158	0.0045	0.400334211	610	60	108	40	0.004914	2.0108088	1	0.0218	120.2792207	9770	0.01	977	0.12
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.000256	0.004096	1.748	0.0045	0.007866	5	60	2	40	0.004914	0.0186732	1	0.0218	1.405284404	79	0.02	57.2	0.02
Selenium	4	0.000256	0.001024	0.0081444	0.0045	3.665E-05	0.05	60	0.3	40	0.004914	0.0007371	1	0.0218	0.082465596	0.8	0.10	0.4	0.21
Thallium	0.37	0.000256	0.00009472	0.00005	0.0045	0.000000225	0.05	60	0.1	40	0.004914	0.00034398	1	0.0218	0.020134174	1.2	0.02	0.12	0.17
Uranium	81.4	0.000256	0.0208384	17.978	0.0045	0.080901	4.381676	60	7.52	40	0.004914	0.027700246	1	0.0218	5.937598418	1,600	0.00	160	0.04
Vanadium	28.2	0.000256	0.0072192	0.0005	0.0045	0.00000225	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	52	0.000256	0.013312	3.774	0.0045	0.016983	40	60	152	40	0.004914	0.4167072	1	0.0218	20.50468807	223.5	0.09	10.5	**1.95**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 20. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045			100	0.004914		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000256	0.004352	0.009378	0.0045	4.22E-05	4	100	0.004914	0.019656	1	0.0218	1.103220183	22.8	0.05	5.7	0.19
Cadmium	0.26	0.000256	0.00006656	0.044516	0.0045	0.000200321	2.1	100	0.004914	0.0103194	1	0.0218	0.485609223	3.4	0.14	0.85	0.57
Chromium	16.5	0.000256	0.004224	0.006383	0.0045	2.8725E-05	0.7	100	0.004914	0.0034398	1	0.0218	0.352868119	5	0.07	1	0.35
Cobalt	11.5	0.000256	0.002944	1.196	0.0045	0.005382	0.3	100	0.004914	0.0014742	1	0.0218	0.449550459	43.9	0.01	23.1	0.02
Copper	25.6	0.000256	0.0065536	0.275158	0.0045	0.001238211	5	100	0.004914	0.02457	1	0.0218	1.484486721	33.2	0.04	26.9	0.06
Lead	16	0.000256	0.004096	0.004544	0.0045	2.045E-05	0.5	100	0.004914	0.002457	1	0.0218	0.301534404	15	0.02	1.5	0.20
Manganese	824	0.000256	0.210944	88.96316	0.0045	0.400334211	610	100	0.004914	2.99754	1	0.0218	165.5421198	9770	0.02	977	0.17
Molybdenum	10.05	0.000256	0.0025728	NM	0.0045	N/A	NM	100	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.000256	0.004096	1.748	0.0045	0.007866	5	100	0.004914	0.02457	1	0.0218	1.675779817	79	0.02	57.2	0.03
Selenium	4	0.000256	0.001024	0.008144	0.0045	3.665E-05	0.05	100	0.004914	0.0002457	1	0.0218	0.059924312	0.8	0.07	0.4	0.15
Thallium	0.37	0.000256	0.00009472	0.00005	0.0045	0.000000225	0.05	100	0.004914	0.0002457	1	0.0218	0.015625917	1.2	0.01	0.12	0.13
Uranium	81.4	0.000256	0.0208384	17.978	0.0045	0.080901	4.381676	100	0.004914	0.0215316	1	0.0218	5.654631003	1600	0.00	160	0.04
Vanadium	28.2	0.000256	0.0072192	0.0005	0.0045	0.00000225	NM	100	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	52	0.000256	0.013312	3.774	0.0045	0.016983	40	100	0.004914	0.19656	1	0.0218	10.40619266	223.5	0.05	10.5	0.99

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 20. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014				100	0.00792		1	0.117					
Arsenic	17	0.00038	0.00646	0.009378	0.014	0.000131289	0.071	1.207	100	0.00792	0.00955944	1	0.117	0.138040418	22.8	0.01	5.7	0.02
Cadmium	0.26	0.00038	0.0000988	0.044516	0.014	0.000623221	69.561	18.08586	100	0.00792	0.14324001	1	0.117	1.23044472	3.4	0.36	0.85	**1.45**
Chromium	16.5	0.00038	0.00627	0.006383	0.014	8.93667E-05	0.8	13.2	100	0.00792	0.104544	1	0.117	0.947892023	5	0.19	1	0.95
Cobalt	11.5	0.00038	0.00437	1.196	0.014	0.016744	0.18	2.07	100	0.00792	0.0163944	1	0.117	0.320584615	43.9	0.01	23.1	0.01
Copper	25.6	0.00038	0.009728	0.275158	0.014	0.003852211	1.398	35.7888	100	0.00792	0.2834473	1	0.117	2.538696637	33.2	0.08	26.9	0.09
Lead	16	0.00038	0.00608	0.004544	0.014	6.36222E-05	2.659	42.544	100	0.00792	0.33694848	1	0.117	2.93241113	15	0.20	1.5	**1.95**
Manganese	824	0.00038	0.31312	88.96316	0.014	1.245484211	0.079	65.096	100	0.00792	0.51556032	1	0.117	17.72790197	9770	0.00	977	0.02
Molybdenum	10.05	0.00038	0.003819	NM	0.014	N/A	1	10.05	100	0.00792	0.079596	1	0.117	0.712948718	35.5	0.02	3.55	0.20
Nickel	16	0.00038	0.00608	1.748	0.014	0.024472	1.143	18.288	100	0.00792	0.14484096	1	0.117	1.499085128	79	0.02	57.2	0.03
Selenium	4	0.00038	0.00152	0.008144	0.014	0.000114022	1.754	7.016	100	0.00792	0.05556672	1	0.117	0.488895233	0.8	0.61	0.4	**1.22**
Thallium	0.37	0.00038	0.0001406	0.00005	0.014	0.0000007	0.123	0.04551	100	0.00792	0.00036044	1	0.117	0.004288369	1.2	0.00	0.12	0.04
Uranium	81.4	0.00038	0.030932	17.978	0.014	0.251692	1	81.4	100	0.00792	0.644688	1	0.117	7.92574359	1600	0.00	160	0.05
Vanadium	28.2	0.00038	0.010716	0.0005	0.014	0.000007	0.019	0.5358	100	0.00792	0.00424354	1	0.117	0.127919111	114	0.00	11.4	0.01
Zinc	52	0.00038	0.01976	3.774	0.014	0.052836	16.364	850.928	100	0.00792	6.73934976	1	0.117	58.22175863	223.5	0.26	10.5	**5.54**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 20. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00151			0.075				100	0.03129		1	1.436					
Arsenic	17	0.00151	0.02567	0.009378	0.075	0.000703333	0.071	1.207	100	0.03129	0.03776703	1	1.436	0.044665991	22.8	0.00	5.7	0.01
Cadmium	0.26	0.00151	0.0003926	0.044516	0.075	0.003338684	69.561	18.08586	100	0.03129	0.56590656	1	1.436	0.396683735	3.4	0.12	0.85	0.47
Chromium	16.5	0.00151	0.024915	0.006383	0.075	0.00047875	0.8	13.2	100	0.03129	0.413028	1	1.436	0.305307625	5	0.06	1	0.31
Cobalt	11.5	0.00151	0.017365	1.196	0.075	0.0897	0.18	2.07	100	0.03129	0.0647703	1	1.436	0.119662465	43.9	0.00	23.1	0.01
Copper	25.6	0.00151	0.038656	0.275158	0.075	0.020636842	1.398	35.7888	100	0.03129	1.11983155	1	1.436	0.821117266	33.2	0.02	26.9	0.03
Lead	16	0.00151	0.02416	0.004544	0.075	0.000340833	2.659	42.544	100	0.03129	1.33120176	1	1.436	0.944082586	15	0.06	1.5	0.63
Manganese	824	0.00151	1.24424	88.96316	0.075	6.672236843	0.079	65.096	100	0.03129	2.03685384	1	1.436	6.931288776	9770	0.00	977	0.01
Molybdenum	10.05	0.00151	0.0151755	0	0.075	N/A	1	10.05	100	0.03129	0.3144645	1	1.436	0.229554318	35.5	0.01	3.55	0.06
Nickel	16	0.00151	0.02416	1.748	0.075	0.1311	1.143	18.288	100	0.03129	0.57223152	1	1.436	0.506609694	79	0.01	57.2	0.01
Selenium	4	0.00151	0.00604	0.008144	0.075	0.000610833	1.754	7.016	100	0.03129	0.21953064	1	1.436	0.15750799	0.8	0.20	0.4	0.39
Thallium	0.37	0.00151	0.0005587	0.00005	0.075	0.00000375	0.123	0.04551	100	0.03129	0.00142401	1	1.436	0.001383327	1.2	0.00	0.12	0.01
Uranium	81.4	0.00151	0.122914	17.978	0.075	1.34835	1	81.4	100	0.03129	2.547006	1	1.436	2.798238162	1600	0.00	160	0.02
Vanadium	28.2	0.00151	0.042582	0.0005	0.075	0.0000375	0.019	0.5358	100	0.03129	0.01676518	1	1.436	0.041354235	114	0.00	11.4	0.00
Zinc	52	0.00151	0.07852	3.774	0.075	0.28305	16.364	850.928	100	0.03129	26.6255371	1	1.436	18.79325008	223.5	0.08	10.5	**1.79**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 20 . Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038			100	0.02077		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.00213	0.03621	0.009378	0.038	0.000356356	4	100	0.02077	0.08308	1	0.515	0.23232302	22.8	0.01	5.7	0.04
Cadmium	0.26	0.00213	0.0005538	0.044516	0.038	0.0016916	2.1	100	0.02077	0.043617	1	0.515	0.089053204	3.4	0.03	0.85	0.10
Chromium	16.5	0.00213	0.035145	0.006383	0.038	0.000242567	0.7	100	0.02077	0.014539	1	0.515	0.09694479	5	0.02	1	0.10
Cobalt	11.5	0.00213	0.024495	1.196	0.038	0.045448	0.3	100	0.02077	0.006231	1	0.515	0.14791068	43.9	0.00	23.1	0.01
Copper	25.6	0.00213	0.054528	0.275158	0.038	0.010456	5	100	0.02077	0.10385	1	0.515	0.32783301	33.2	0.01	26.9	0.01
Lead	16	0.00213	0.03408	0.004544	0.038	0.000172689	0.5	100	0.02077	0.010385	1	0.515	0.086675124	15	0.01	1.5	0.06
Manganese	824	0.00213	1.75512	88.96316	0.038	3.3806	610	100	0.02077	12.6697	1	0.515	34.57363107	9770	0.00	977	0.04
Molybdenum	10.05	0.00213	0.0214065	NM	0.038	N/A	NM	100	0.02077	N/A	1	0.515	N/A	35.5	N/A	3.55	N/A
Nickel	16	0.00213	0.03408	1.748	0.038	0.066424	5	100	0.02077	0.10385	1	0.515	0.396803883	79	0.01	57.2	0.01
Selenium	4	0.00213	0.00852	0.008144	0.038	0.000309489	0.05	100	0.02077	0.0010385	1	0.515	0.019161143	0.8	0.02	0.4	0.05
Thallium	0.37	0.00213	0.0007881	0.00005	0.038	0.0000019	0.05	100	0.02077	0.0010385	1	0.515	0.003550485	1.2	0.00	0.12	0.03
Uranium	81.4	0.00213	0.173382	17.978	0.038	0.683164	4.381676	100	0.02077	0.0910074	1	0.515	1.839909535	1600	0.00	160	0.01
Vanadium	28.2	0.00213	0.060066	0.0005	0.038	0.000019	NM	100	0.02077	N/A	1	0.515	N/A	114	N/A	11.4	N/A
Zinc	52	0.00213	0.11076	3.774	0.038	0.143412	40	100	0.02077	0.8308	1	0.515	2.106741748	223.5	0.01	10.5	0.20

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 20. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000724			0.0106				100	0.006236		1	0.0771					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.000724	0.012308	0.009378	0.0106	9.94044E-05	0.925	15.725	100	0.006236	0.0980611	1	0.0771	1.432795129	22.8	0.06	5.7	0.25
Cadmium	0.26	0.000724	0.00018824	0.044516	0.0106	0.000471867	190	49.4	100	0.006236	0.3080584	1	0.0771	4.004131094	3.4	**1.18**	0.85	**4.71**
Chromium	16.5	0.000724	0.011946	0.006383	0.0106	6.76633E-05	11.416	188.364	100	0.006236	1.1746379	1	0.0771	15.39107091	5	**3.08**	1	**15.39**
Cobalt	11.5	0.000724	0.008326	1.196	0.0106	0.0126776	0.321	3.6915	100	0.006236	0.0230202	1	0.0771	0.570996031	43.9	0.01	23.1	0.02
Copper	25.6	0.000724	0.0185344	0.275158	0.0106	0.002916674	5.492	140.5952	100	0.006236	0.8767517	1	0.0771	11.649841	33.2	0.35	26.9	0.43
Lead	16	0.000724	0.011584	0.004544	0.0106	4.81711E-05	228.261	3652.176	100	0.006236	22.77497	1	0.0771	295.5460662	15	**19.70**	1.5	**197.03**
Manganese	824	0.000724	0.596576	88.96316	0.0106	0.943009474	0.228	187.872	100	0.006236	1.1715698	1	0.0771	35.16414093	9770	0.00	977	0.04
Molybdenum	10.05	0.000724	0.0072762	NM	0.0106	N/A	2.091	21.01455	100	0.006236	0.1310467	1	0.0771	1.794071774	35.5	0.05	3.55	0.51
Nickel	16	0.000724	0.011584	1.748	0.0106	0.0185288	7.802	124.832	100	0.006236	0.7784524	1	0.0771	10.48722636	79	0.13	57.2	0.18
Selenium	4	0.000724	0.002896	0.008144	0.0106	8.63311E-05	13.733	54.932	100	0.006236	0.342556	1	0.0771	4.481689794	0.8	**5.60**	0.4	**11.20**
Thallium	0.37	0.000724	0.00026788	0.00005	0.0106	0.00000053	1	0.37	100	0.006236	0.0023073	1	0.0771	0.033407652	1.2	0.03	0.12	0.28
Uranium	81.4	0.000724	0.0589336	17.978	0.0106	0.1905668	0.063	5.1282	100	0.006236	0.0319795	1	0.0771	3.650841183	1600	0.00	160	0.02
Vanadium	28.2	0.000724	0.0204168	0.0005	0.0106	0.0000053	0.088	2.4816	100	0.006236	0.0154753	1	0.0771	0.465594781	114	0.00	11.4	0.04
Zinc	52	0.000724	0.037648	3.774	0.0106	0.0400044	49.51	2574.52	100	0.006236	16.054707	1	0.0771	209.2394179	223.5	0.94	10.5	**19.93**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 26. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	17	0.000111	0.001887	0.009378	0.0061	5.72044E-05	19	100	0.004929	0.093651	1	0.0394	2.426274224	9.63	0.25	1.91	**1.27**
Cadmium	0.26	0.000111	0.00002886	0.044516	0.0061	0.000271546	4	100	0.004929	0.019716	1	0.0394	0.508030617	2.3	0.22	0.23	**2.21**
Chromium	16.5	0.000111	0.0018315	0.006383	0.0061	3.89383E-05	16	100	0.004929	0.078864	1	0.0394	2.04909742	56.8	0.04	5.68	0.36
Cobalt	11.5	0.000111	0.0012765	1.196	0.0061	0.0072956	15	100	0.004929	0.073935	1	0.0394	2.094088832	20	0.10	5	0.42
Copper	25.6	0.000111	0.0028416	0.275158	0.0061	0.001678463	116	100	0.004929	0.571764	1	0.0394	14.62649906	35.4	0.41	24.3	0.60
Lead	16	0.000111	0.001776	0.004544	0.0061	2.77211E-05	37.9	100	0.004929	0.1868091	1	0.0394	4.787127439	80	0.06	8	0.60
Manganese	824	0.000111	0.091464	88.96316	0.0061	0.542675263	1420	100	0.004929	6.99918	1	0.0394	193.7390676	268	0.72	83	**2.33**
Molybdenum	10.05	0.000111	0.00111555	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.000111	0.001776	1.748	0.0061	0.0106628	26	100	0.004929	0.128154	1	0.0394	3.568345178	42.1	0.08	23.1	0.15
Selenium	4	0.000111	0.000444	0.008144	0.0061	4.96811E-05	0.5	100	0.004929	0.0024645	1	0.0394	0.075080739	0.25	0.30	0.025	**3.00**
Thallium	0.37	0.000111	0.00004107	0.00005	0.0061	0.000000305	0.4	100	0.004929	0.0019716	1	0.0394	0.051090736	0.74	0.07	0.074	0.69
Uranium	81.4	0.000111	0.0090354	17.978	0.0061	0.1096658	876.08901	100	0.004929	4.3182427	1	0.0394	112.6127901	5	**22.52**	0.5	**225.23**
Vanadium	28.2	0.000111	0.0031302	0.0005	0.0061	0.00000305	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.000111	0.005772	3.774	0.0061	0.0230214	147	100	0.004929	0.724563	1	0.0394	19.12072081	225	0.08	22.5	0.85

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 32. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	17	0.000111	0.001887	0.009378	0.0061	5.72044E-05	4	100	0.004929	0.019716	1	0.0394	0.549751382	9.63	0.06	1.91	0.29
Cadmium	0.26	0.000111	0.00002886	0.044516	0.0061	0.000271546	2.1	100	0.004929	0.0103509	1	0.0394	0.270337724	2.3	0.12	0.23	**1.18**
Chromium	16.5	0.000111	0.0018315	0.006383	0.0061	3.89383E-05	0.7	100	0.004929	0.0034503	1	0.0394	0.13504412	56.8	0.00	5.68	0.02
Cobalt	11.5	0.000111	0.0012765	1.196	0.0061	0.0072956	0.3	100	0.004929	0.0014787	1	0.0394	0.255096447	20	0.01	5	0.05
Copper	25.6	0.000111	0.0028416	0.275158	0.0061	0.001678463	5	100	0.004929	0.024645	1	0.0394	0.740230029	35.4	0.02	24.3	0.03
Lead	16	0.000111	0.001776	0.004544	0.0061	2.77211E-05	0.5	100	0.004929	0.0024645	1	0.0394	0.108330485	80	0.00	8	0.01
Manganese	824	0.000111	0.091464	88.96316	0.0061	0.542675263	610	100	0.004929	3.00669	1	0.0394	92.40683409	268	0.34	83	**1.11**
Molybdenum	10.05	0.000111	0.00111555	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.000111	0.001776	1.748	0.0061	0.0106628	5	100	0.004929	0.024645	1	0.0394	0.941213198	42.1	0.02	23.1	0.04
Selenium	4	0.000111	0.000444	0.008144	0.0061	4.96811E-05	0.05	100	0.004929	0.0002465	1	0.0394	0.018785054	0.25	0.08	0.025	0.75
Thallium	0.37	0.000111	0.00004107	0.00005	0.0061	0.000000305	0.05	100	0.004929	0.0002465	1	0.0394	0.007305203	0.74	0.01	0.074	0.10
Uranium	81.4	0.000111	0.0090354	17.978	0.0061	0.1096658	4.381676	100	0.004929	0.0215973	1	0.0394	3.560875152	5	0.71	0.5	**7.12**
Vanadium	28.2	0.000111	0.0031302	0.0005	0.0061	0.00000305	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.000111	0.005772	3.774	0.0061	0.0230214	40	100	0.004929	0.19716	1	0.0394	5.734857868	225	0.03	22.5	0.25

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PB 20. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61			100	1.517		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.083	1.411	0.009378	3.61	0.033853778	4	100	1.517	6.068	1	68.6	0.109516819	9.63	0.01	1.91	0.06
Cadmium	0.26	0.083	0.02158	0.044516	3.61	0.160702	2.1	100	1.517	3.1857	1	68.6	0.049095948	2.3	0.02	0.23	0.21
Chromium	16.5	0.083	1.3695	0.006383	3.61	0.023043833	0.7	100	1.517	1.0619	1	68.6	0.035779065	56.8	0.00	5.68	0.01
Cobalt	11.5	0.083	0.9545	1.196	3.61	4.31756	0.3	100	1.517	0.4551	1	68.6	0.083486297	20	0.00	5	0.02
Copper	25.6	0.083	2.1248	0.275158	3.61	0.99332	5	100	1.517	7.585	1	68.6	0.156022157	35.4	0.00	24.3	0.01
Lead	16	0.083	1.328	0.004544	3.61	0.016405444	0.5	100	1.517	0.7585	1	68.6	0.030654598	80	0.00	8	0.00
Manganese	824	0.083	68.392	88.96316	3.61	321.157	610	100	1.517	925.37	1	68.6	19.16791545	268	0.07	83	0.23
Molybdenum	10.05	0.083	0.83415	NM	3.61	N/A	NM	100	1.517	N/A	1	68.6	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.083	1.328	1.748	3.61	6.31028	5	100	1.517	7.585	1	68.6	0.221913703	42.1	0.01	23.1	0.01
Selenium	4	0.083	0.332	0.008144	3.61	0.029401444	0.05	100	1.517	0.07585	1	68.6	0.006373928	0.25	0.03	0.025	0.25
Thallium	0.37	0.083	0.03071	0.00005	3.61	0.0001805	0.05	100	1.517	0.07585	1	68.6	0.001555984	0.74	0.00	0.074	0.02
Uranium	81.4	0.083	6.7562	17.978	3.61	64.90058	4.381676	100	1.517	6.6470025	1	68.6	1.141454555	5	0.23	0.5	**2.28**
Vanadium	28.2	0.083	2.3406	0.0005	3.61	0.001805	NM	100	1.517	N/A	1	68.6	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.083	4.316	3.774	3.61	13.62414	40	100	1.517	60.68	1	68.6	1.146066181	225	0.01	22.5	0.05

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PD 20. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0072			1.02				100	0.2498		1	13.3					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	17	0.0072	0.1224	0.009378	1.02	0.009565333	0.071	1.207	100	0.2498	0.3015086	1	13.3	0.032592025	9.63	0.00	1.91	0.02
Cadmium	0.26	0.0072	0.001872	0.044516	1.02	0.045406105	69.561	18.08586	100	0.2498	4.51784783	1	13.3	0.343242551	2.3	0.15	0.23	**1.49**
Chromium	16.5	0.0072	0.1188	0.006383	1.02	0.006511	0.8	13.2	100	0.2498	3.29736	1	13.3	0.257343684	56.8	0.00	5.68	0.05
Cobalt	11.5	0.0072	0.0828	1.196	1.02	1.21992	0.18	2.07	100	0.2498	0.517086	1	13.3	0.136827519	20	0.01	5	0.03
Copper	25.6	0.0072	0.18432	0.275158	1.02	0.280661053	1.398	35.7888	100	0.2498	8.94004224	1	13.3	0.707144608	35.4	0.02	24.3	0.03
Lead	16	0.0072	0.1152	0.004544	1.02	0.004635333	2.659	42.544	100	0.2498	10.6274912	1	13.3	0.808069664	80	0.01	8	0.10
Manganese	824	0.0072	5.9328	88.96316	1.02	90.74242106	0.079	65.096	100	0.2498	16.2609808	1	13.3	8.491443749	268	0.03	83	0.10
Molybdenum	10.05	0.0072	0.07236	NM	1.02	N/A	1	10.05	100	0.2498	2.51049	1	13.3	0.194199248	1.9	0.10	0.19	**1.02**
Nickel	16	0.0072	0.1152	1.748	1.02	1.78296	1.143	18.288	100	0.2498	4.5683424	1	13.3	0.486203188	42.1	0.01	23.1	0.02
Selenium	4	0.0072	0.0288	0.008144	1.02	0.008307333	1.754	7.016	100	0.2498	1.7525968	1	13.3	0.134564221	0.25	0.54	0.025	**5.38**
Thallium	0.37	0.0072	0.002664	0.00005	1.02	0.000051	0.123	0.04551	100	0.2498	0.0113684	1	13.3	0.001058902	0.74	0.00	0.074	0.01
Uranium	81.4	0.0072	0.58608	17.978	1.02	18.33756	1	81.4	100	0.2498	20.33372	1	13.3	2.951681203	5	0.59	0.5	**5.90**
Vanadium	28.2	0.0072	0.20304	0.0005	1.02	0.00051	0.019	0.5358	100	0.2498	0.13384284	1	13.3	0.025367883	2.1	0.01	0.21	0.12
Zinc	52	0.0072	0.3744	3.774	1.02	3.84948	16.364	850.928	100	0.2498	212.561814	1	13.3	16.29967627	225	0.07	22.5	0.72

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 20. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00529			0.73				100	0.18371		1	9.2					
Arsenic	17	0.00529	0.08993	0.009378	0.73	0.006845778	0.071	1.207	100	0.18371	0.22173797	1	9.2	0.03462106	9.63	0.00	1.91	0.02
Cadmium	0.26	0.00529	0.0013754	0.044516	0.73	0.032496526	69.561	18.08586	100	0.18371	3.32255334	1	9.2	0.364828833	2.3	0.16	0.23	**1.59**
Chromium	16.5	0.00529	0.087285	0.006383	0.73	0.004659833	0.8	13.2	100	0.18371	2.424972	1	9.2	0.273577917	56.8	0.00	5.68	0.05
Cobalt	11.5	0.00529	0.060835	1.196	0.73	0.87308	0.18	2.07	100	0.18371	0.3802797	1	9.2	0.14284725	20	0.01	5	0.03
Copper	25.6	0.00529	0.135424	0.275158	0.73	0.200865263	1.398	35.7888	100	0.18371	6.57476045	1	9.2	0.751201056	35.4	0.02	24.3	0.03
Lead	16	0.00529	0.08464	0.004544	0.73	0.003317444	2.659	42.544	100	0.18371	7.81575824	1	9.2	0.859099531	80	0.01	8	0.11
Manganese	824	0.00529	4.35896	88.96316	0.73	64.94310527	0.079	65.096	100	0.18371	11.9587862	1	9.2	8.832701242	268	0.03	83	0.11
Molybdenum	10.05	0.00529	0.0531645	NM	0.73	N/A	1	10.05	100	0.18371	1.8462855	1	9.2	0.206461957	1.9	0.11	0.19	**1.09**
Nickel	16	0.00529	0.08464	1.748	0.73	1.27604	1.143	18.288	100	0.18371	3.35968848	1	9.2	0.51308353	42.1	0.01	23.1	0.02
Selenium	4	0.00529	0.02116	0.008144	0.73	0.005945444	1.754	7.016	100	0.18371	1.28890936	1	9.2	0.143045087	0.25	0.57	0.025	**5.72**
Thallium	0.37	0.00529	0.0019573	0.00005	0.73	0.0000365	0.123	0.04551	100	0.18371	0.00836064	1	9.2	0.001125483	0.74	0.00	0.074	0.02
Uranium	81.4	0.00529	0.430606	17.978	0.73	13.12394	1	81.4	100	0.18371	14.953994	1	9.2	3.098754348	5	0.62	0.5	**6.20**
Vanadium	28.2	0.00529	0.149178	0.0005	0.73	0.000365	0.019	0.5358	100	0.18371	0.09843182	1	9.2	0.026953785	2.1	0.01	0.21	0.13
Zinc	52	0.00529	0.27508	3.774	0.73	2.75502	16.364	850.928	100	0.18371	156.323983	1	9.2	17.32109597	225	0.08	22.5	0.77

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 20. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231				100	0.002835		1	0.00428					
Arsenic	17	0.000155	0.002635	0.009378	0.00231	2.16627E-05	0.925	15.725	100	0.002835	0.0445804	1	0.00428	11.03669104	9.63	**1.15**	1.91	**5.78**
Cadmium	0.26	0.000155	0.0000403	0.044516	0.00231	0.000102831	190	49.4	100	0.002835	0.140049	1	0.00428	32.75517091	2.3	**14.24**	0.23	**142.41**
Chromium	16.5	0.000155	0.0025575	0.006383	0.00231	1.47455E-05	11.416	188.364	100	0.002835	0.5340119	1	0.00428	125.3701368	56.8	**2.21**	5.68	**22.07**
Cobalt	11.5	0.000155	0.0017825	1.196	0.00231	0.00276276	0.321	3.6915	100	0.002835	0.0104654	1	0.00428	3.507164136	20	0.18	5	0.70
Copper	25.6	0.000155	0.003968	0.275158	0.00231	0.000635615	5.492	140.5952	100	0.002835	0.3985874	1	0.00428	94.20350625	35.4	**2.66**	24.3	**3.88**
Lead	16	0.000155	0.00248	0.004544	0.00231	1.04977E-05	228.261	3652.176	100	0.002835	10.353919	1	0.00428	2419.721836	80	**30.25**	8	**302.47**
Manganese	824	0.000155	0.12772	88.96316	0.00231	0.205504895	0.228	187.872	100	0.002835	0.5326171	1	0.00428	202.2995362	268	0.75	83	**2.44**
Molybdenum	10.05	0.000155	0.00155775	NM	0.00231	N/A	2.091	21.01455	100	0.002835	0.0595762	1	0.00428	14.28364468	1.9	**7.52**	0.19	**75.18**
Nickel	16	0.000155	0.00248	1.748	0.00231	0.00403788	7.802	124.832	100	0.002835	0.3538987	1	0.00428	84.20948598	42.1	**2.00**	23.1	**3.65**
Selenium	4	0.000155	0.00062	0.008144	0.00231	1.88137E-05	13.733	54.932	100	0.002835	0.1557322	1	0.00428	36.53528824	0.25	**146.14**	0.025	**1461.41**
Thallium	0.37	0.000155	0.00005735	0.00005	0.00231	1.155E-07	1	0.37	100	0.002835	0.001049	1	0.00428	0.258508294	0.74	0.35	0.074	**3.49**
Uranium	81.4	0.000155	0.012617	17.978	0.00231	0.04152918	0.063	5.1282	100	0.002835	0.0145384	1	0.00428	16.04781005	5	**3.21**	0.5	**32.10**
Vanadium	28.2	0.000155	0.004371	0.0005	0.00231	0.000001155	0.088	2.4816	100	0.002835	0.0070353	1	0.00428	2.665301636	2.1	**1.27**	0.21	**12.69**
Zinc	52	0.000155	0.00806	3.774	0.00231	0.00871794	49.51	2574.52	100	0.002835	7.2987642	1	0.00428	1709.238818	225	**7.60**	22.5	**75.97**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 20. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Mined Area; Water Concentrations from Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000317			0.00229			58		42	0.003183		1	0.0185					
Arsenic	17	0.000317	0.005389	0.009378	0.00229	2.14751E-05	4	58	2.1	42	0.003183	0.01019197	1	0.0185	0.843375195	9.63	0.09	1.91	0.44
Cadmium	0.26	0.000317	0.00008242	0.044516	0.00229	0.000101941	2.1	58	1.3	42	0.003183	0.00561481	1	0.0185	0.313468819	2.3	0.14	0.23	**1.36**
Chromium	16.5	0.000317	0.0052305	0.006383	0.00229	1.46178E-05	0.7	58	2.2	42	0.003183	0.00423339	1	0.0185	0.512351775	56.8	0.01	5.68	0.09
Cobalt	11.5	0.000317	0.0036455	1.196	0.00229	0.00273884	0.3	58	1.26	42	0.003183	0.00223829	1	0.0185	0.46608787	20	0.02	5	0.09
Copper	25.6	0.000317	0.0081152	0.275158	0.00229	0.000630112	5	58	69.1	42	0.003183	0.10160773	1	0.0185	5.965029058	35.4	0.17	24.3	0.25
Lead	16	0.000317	0.005072	0.004544	0.00229	1.04068E-05	0.5	58	3.5	42	0.003183	0.00560208	1	0.0185	0.577539826	80	0.01	8	0.07
Manganese	824	0.000317	0.261208	88.96316	0.00229	0.203725632	610	58	108	42	0.003183	1.27052628	1	0.0185	93.80864387	268	0.35	83	**1.13**
Molybdenum	10.05	0.000317	0.00318585	NM	0.00229	N/A	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	1.9	N/A	0.19	N/A
Nickel	16	0.000317	0.005072	1.748	0.00229	0.00400292	5	58	2	42	0.003183	0.01190442	1	0.0185	1.134018378	42.1	0.03	23.1	0.05
Selenium	4	0.000317	0.001268	0.008144	0.00229	1.86508E-05	0.05	58	0.3	42	0.003183	0.00049337	1	0.0185	0.096217069	0.25	0.38	0.025	**3.85**
Thallium	0.37	0.000317	0.00011729	0.00005	0.00229	1.145E-07	0.05	58	0.1	42	0.003183	0.00022599	1	0.0185	0.018562027	0.74	0.03	0.074	0.25
Uranium	81.4	0.000317	0.0258038	17.978	0.00229	0.04116962	4.381676	58	7.52	42	0.003183	0.01814237	1	0.0185	4.600853758	5	0.92	0.5	**9.20**
Vanadium	28.2	0.000317	0.0089394	0.0005	0.00229	0.000001145	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	2.1	N/A	0.21	N/A
Zinc	52	0.000317	0.016484	3.774	0.00229	0.00864246	40	58	152	42	0.003183	0.27704832	1	0.0185	16.33377189	225	0.07	22.5	0.73

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 21. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000142			0.00473			100	0.0148858		1	0.0231					
Arsenic	3.8	0.0000142	0.00005396	0.0025	0.00473	0.000011825	2.1	100	0.0148858	0.03126018	1	0.0231	1.356102381	22.8	0.06	5.7	0.24
Cadmium	0.34	0.0000142	0.000004828	0.0008803	0.00473	4.16368E-06	1.3	100	0.0148858	0.01935154	1	0.0231	0.838118254	3.4	0.25	0.85	0.99
Chromium	16.7	0.0000142	0.00023714	0.0020391	0.00473	9.64515E-06	2.2	100	0.0148858	0.03274876	1	0.0231	1.428378578	5	0.29	1	**1.43**
Cobalt	11	0.0000142	0.0001562	0.0007656	0.00473	3.62141E-06	1.26	100	0.0148858	0.018756108	1	0.0231	0.818871403	43.9	0.02	23.1	0.04
Copper	17.5	0.0000142	0.0002485	0.0044	0.00473	0.000020812	69.1	100	0.0148858	1.02860878	1	0.0231	44.54017714	33.2	**1.34**	26.9	**1.66**
Lead	15.2	0.0000142	0.00021584	0.0006957	0.00473	3.29073E-06	3.5	100	0.0148858	0.0521003	1	0.0231	2.264910421	15	0.15	1.5	**1.51**
Manganese	833	0.0000142	0.0118286	0.0944	0.00473	0.000446512	108	100	0.0148858	1.6076664	1	0.0231	70.12733818	9770	0.01	977	0.07
Molybdenum	0.73	0.0000142	0.000010366	NM	0.00473	N/A	NM	100	0.0148858	N/A	1	0.0231	N/A	35.5	N/A	3.55	N/A
Nickel	13.3	0.0000142	0.00018886	0.0259003	0.00473	0.000122508	2	100	0.0148858	0.0297716	1	0.0231	1.302293002	79	0.02	57.2	0.02
Selenium	0.085	0.0000142	0.000001207	0.0005	0.00473	0.000002365	0.3	100	0.0148858	0.00446574	1	0.0231	0.19347671	0.8	0.24	0.4	0.48
Thallium	0.145625	0.0000142	2.06788E-06	0.0015	0.00473	0.000007095	0.1	100	0.0148858	0.00148858	1	0.0231	0.064837354	1.2	0.05	0.12	0.54
Uranium	6.955	0.0000142	0.000098761	0.0505	0.00473	0.000238865	7.52	100	0.0148858	0.111941216	1	0.0231	4.860555931	1600	0.00	160	0.03
Vanadium	30.8	0.0000142	0.00043736	0.0013647	0.00473	6.45497E-06	NM	100	0.0148858	N/A	1	0.0231	N/A	114	N/A	11.4	N/A
Zinc	51.1	0.0000142	0.00072562	0.0297351	0.00473	0.000140647	152	100	0.0148858	2.2626416	1	0.0231	97.98735356	223.5	0.44	10.5	**9.33**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 21. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			60		40	0.004914		1	0.0218					
Arsenic	3.8	0.000256	0.0009728	0.0025	0.0045	0.00001125	4	60	2.1	40	0.004914	0.01592136	1	0.0218	0.775477523	22.8	0.03	5.7	0.14
Cadmium	0.34	0.000256	0.00008704	0.0008803	0.0045	3.96122E-06	2.1	60	1.3	40	0.004914	0.00874692	1	0.0218	0.40540923	3.4	0.12	0.85	0.48
Chromium	16.7	0.000256	0.0042752	0.0020391	0.0045	9.17614E-06	0.7	60	2.2	40	0.004914	0.0063882	1	0.0218	0.489567713	5	0.10	1	0.49
Cobalt	11	0.000256	0.002816	0.0007656	0.0045	3.44531E-06	0.3	60	1.26	40	0.004914	0.003361176	1	0.0218	0.283514739	43.9	0.01	23.1	0.01
Copper	17.5	0.000256	0.00448	0.0044	0.0045	0.0000198	5	60	69.1	40	0.004914	0.15056496	1	0.0218	7.113062385	33.2	0.21	26.9	0.26
Lead	15.2	0.000256	0.0038912	0.0006957	0.0045	3.13071E-06	0.5	60	3.5	40	0.004914	0.0083538	1	0.0218	0.561840858	15	0.04	1.5	0.37
Manganese	833	0.000256	0.213248	0.0944	0.0045	0.0004248	610	60	108	40	0.004914	2.0108088	1	0.0218	102.0404404	9770	0.01	977	0.10
Molybdenum	0.73	0.000256	0.00018688	NM	0.0045	N/A	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	13.3	0.000256	0.0034048	0.0259003	0.0045	0.000116551	5	60	2	40	0.004914	0.0186732	1	0.0218	1.018098683	79	0.01	57.2	0.02
Selenium	0.085	0.000256	0.00002176	0.0005	0.0045	0.00000225	0.05	60	0.3	40	0.004914	0.0007371	1	0.0218	0.034913303	0.8	0.04	0.4	0.09
Thallium	0.145625	0.000256	0.00003728	0.0015	0.0045	0.00000675	0.05	60	0.1	40	0.004914	0.00034398	1	0.0218	0.017798624	1.2	0.01	0.12	0.15
Uranium	6.955	0.000256	0.00178048	0.0505	0.0045	0.00022725	4.381676	60	7.52	40	0.004914	0.027700246	1	0.0218	1.362751171	1,600	0.00	160	0.01
Vanadium	30.8	0.000256	0.0078848	0.0013647	0.0045	6.14109E-06	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	51.1	0.000256	0.0130816	0.0297351	0.0045	0.000133808	40	60	152	40	0.004914	0.4167072	1	0.0218	19.72122056	223.5	0.09	10.5	**1.88**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 21. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045			100	0.004914		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.000256	0.0009728	0.0025	0.0045	0.00001125	4	100	0.004914	0.019656	1	0.0218	0.946791284	22.8	0.04	5.7	0.17
Cadmium	0.34	0.000256	0.00008704	0.00088	0.0045	3.96122E-06	2.1	100	0.004914	0.0103194	1	0.0218	0.47754134	3.4	0.14	0.85	0.56
Chromium	16.7	0.000256	0.0042752	0.002039	0.0045	9.17614E-06	0.7	100	0.004914	0.0034398	1	0.0218	0.354320007	5	0.07	1	0.35
Cobalt	11	0.000256	0.002816	0.000766	0.0045	3.44531E-06	0.3	100	0.004914	0.0014742	1	0.0218	0.196956207	43.9	0.00	23.1	0.01
Copper	17.5	0.000256	0.00448	0.0044	0.0045	0.0000198	5	100	0.004914	0.02457	1	0.0218	1.333477064	33.2	0.04	26.9	0.05
Lead	15.2	0.000256	0.0038912	0.000696	0.0045	3.13071E-06	0.5	100	0.004914	0.002457	1	0.0218	0.291345446	15	0.02	1.5	0.19
Manganese	833	0.000256	0.213248	0.0944	0.0045	0.0004248	610	100	0.004914	2.99754	1	0.0218	147.3033394	9770	0.02	977	0.15
Molybdenum	0.73	0.000256	0.00018688	NM	0.0045	N/A	NM	100	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	13.3	0.000256	0.0034048	0.0259	0.0045	0.000116551	5	100	0.004914	0.02457	1	0.0218	1.288594096	79	0.02	57.2	0.02
Selenium	0.085	0.000256	0.00002176	0.0005	0.0045	0.00000225	0.05	100	0.004914	0.0002457	1	0.0218	0.012372018	0.8	0.02	0.4	0.03
Thallium	0.145625	0.000256	0.00003728	0.0015	0.0045	0.00000675	0.05	100	0.004914	0.0002457	1	0.0218	0.013290367	1.2	0.01	0.12	0.11
Uranium	6.955	0.000256	0.00178048	0.0505	0.0045	0.00022725	4.381676	100	0.004914	0.0215316	1	0.0218	1.079783755	1600	0.00	160	0.01
Vanadium	30.8	0.000256	0.0078848	0.001365	0.0045	6.14109E-06	NM	100	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	51.1	0.000256	0.0130816	0.029735	0.0045	0.000133808	40	100	0.004914	0.19656	1	0.0218	9.622725143	223.5	0.04	10.5	0.92

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 21. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014				100	0.00792		1	0.117					
Arsenic	3.8	0.00038	0.001444	0.0025	0.014	0.000035	0.071	0.2698	100	0.00792	0.00213682	1	0.117	0.03090441	22.8	0.00	5.7	0.01
Cadmium	0.34	0.00038	0.0001292	0.00088	0.014	1.23238E-05	69.561	23.65074	100	0.00792	0.18731386	1	0.117	1.602182774	3.4	0.47	0.85	**1.88**
Chromium	16.7	0.00038	0.006346	0.002039	0.014	2.8548E-05	0.8	13.36	100	0.00792	0.1058112	1	0.117	0.958852547	5	0.19	1	0.96
Cobalt	11	0.00038	0.00418	0.000766	0.014	1.07188E-05	0.18	1.98	100	0.00792	0.0156816	1	0.117	0.169848878	43.9	0.00	23.1	0.01
Copper	17.5	0.00038	0.00665	0.0044	0.014	0.0000616	1.398	24.465	100	0.00792	0.1937628	1	0.117	1.71345641	33.2	0.05	26.9	0.06
Lead	15.2	0.00038	0.005776	0.000696	0.014	9.74E-06	2.659	40.4168	100	0.00792	0.32010106	1	0.117	2.785357231	15	0.19	1.5	**1.86**
Manganese	833	0.00038	0.31654	0.0944	0.014	0.0013216	0.079	65.807	100	0.00792	0.52119144	1	0.117	7.171393504	9770	0.00	977	0.01
Molybdenum	0.73	0.00038	0.0002774	NM	0.014	N/A	1	0.73	100	0.00792	0.0057816	1	0.117	0.051786325	35.5	0.00	3.55	0.01
Nickel	13.3	0.00038	0.005054	0.0259	0.014	0.000362604	1.143	15.2019	100	0.00792	0.12039905	1	0.117	1.075347453	79	0.01	57.2	0.02
Selenium	0.085	0.00038	0.0000323	0.0005	0.014	0.000007	1.754	0.14909	100	0.00792	0.00118079	1	0.117	0.010428144	0.8	0.01	0.4	0.03
Thallium	0.145625	0.00038	5.53375E-05	0.0015	0.014	0.000021	0.123	0.017911875	100	0.00792	0.00014186	1	0.117	0.001864953	1.2	0.00	0.12	0.02
Uranium	6.955	0.00038	0.0026429	0.0505	0.014	0.000707	1	6.955	100	0.00792	0.0550836	1	0.117	0.499431624	1600	0.00	160	0.00
Vanadium	30.8	0.00038	0.011704	0.001365	0.014	1.91056E-05	0.019	0.5852	100	0.00792	0.00463478	1	0.117	0.139811022	114	0.00	11.4	0.01
Zinc	51.1	0.00038	0.019418	0.029735	0.014	0.000416292	16.364	836.2004	100	0.00792	6.62270717	1	0.117	56.77385863	223.5	0.25	10.5	**5.41**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 21. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00151			0.075				100	0.03129		1	1.436					
Arsenic	3.8	0.00151	0.005738	0.0025	0.075	0.0001875	0.071	0.2698	100	0.03129	0.00844204	1	1.436	0.010005252	22.8	0.00	5.7	0.00
Cadmium	0.34	0.00151	0.0005134	0.00088	0.075	6.60203E-05	69.561	23.65074	100	0.03129	0.74003165	1	1.436	0.515745874	3.4	0.15	0.85	0.61
Chromium	16.7	0.00151	0.025217	0.002039	0.075	0.000152936	0.8	13.36	100	0.03129	0.4180344	1	1.436	0.308777393	5	0.06	1	0.31
Cobalt	11	0.00151	0.01661	0.000766	0.075	5.74219E-05	0.18	1.98	100	0.03129	0.0619542	1	1.436	0.054750433	43.9	0.00	23.1	0.00
Copper	17.5	0.00151	0.026425	0.0044	0.075	0.00033	1.398	24.465	100	0.03129	0.76550985	1	1.436	0.551716469	33.2	0.02	26.9	0.02
Lead	15.2	0.00151	0.022952	0.000696	0.075	5.21786E-05	2.659	40.4168	100	0.03129	1.26464167	1	1.436	0.896689311	15	0.06	1.5	0.60
Manganese	833	0.00151	1.25783	0.0944	0.075	0.00708	0.079	65.807	100	0.03129	2.05910103	1	1.436	2.314770912	9770	0.00	977	0.00
Molybdenum	0.73	0.00151	0.0011023	NM	0.075	N/A	1	0.73	100	0.03129	0.0228417	1	1.436	0.016674095	35.5	0.00	3.55	0.00
Nickel	13.3	0.00151	0.020083	0.0259	0.075	0.001942521	1.143	15.2019	100	0.03129	0.47566745	1	1.436	0.34658285	79	0.00	57.2	0.01
Selenium	0.085	0.00151	0.00012835	0.0005	0.075	0.0000375	1.754	0.14909	100	0.03129	0.00466503	1	1.436	0.00336412	0.8	0.00	0.4	0.01
Thallium	0.145625	0.00151	0.000219894	0.0015	0.075	0.0001125	0.123	0.017911875	100	0.03129	0.00056046	1	1.436	0.000621766	1.2	0.00	0.12	0.01
Uranium	6.955	0.00151	0.01050205	0.0505	0.075	0.0037875	1	6.955	100	0.03129	0.21762195	1	1.436	0.161498259	1600	0.00	160	0.00
Vanadium	30.8	0.00151	0.046508	0.001365	0.075	0.000102352	0.019	0.5852	100	0.03129	0.01831091	1	1.436	0.045209791	114	0.00	11.4	0.00
Zinc	51.1	0.00151	0.077161	0.029735	0.075	0.002230135	16.364	836.2004	100	0.03129	26.1647105	1	1.436	18.2758368	223.5	0.08	10.5	**1.74**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 21. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00213			0.038			100	0.02077		1	0.515					
Arsenic	3.8	0.00213	0.008094	0.0025	0.038	0.000095	4	100	0.02077	0.08308	1	0.515	0.177221359	22.8	0.01	5.7	0.03
Cadmium	0.34	0.00213	0.0007242	0.00088	0.038	3.34503E-05	2.1	100	0.02077	0.043617	1	0.515	0.086164369	3.4	0.03	0.85	0.10
Chromium	16.7	0.00213	0.035571	0.002039	0.038	7.74874E-05	0.7	100	0.02077	0.014539	1	0.515	0.097451432	5	0.02	1	0.10
Cobalt	11	0.00213	0.02343	0.000766	0.038	2.90938E-05	0.3	100	0.02077	0.006231	1	0.515	0.057650667	43.9	0.00	23.1	0.00
Copper	17.5	0.00213	0.037275	0.0044	0.038	0.0001672	5	100	0.02077	0.10385	1	0.515	0.274353786	33.2	0.01	26.9	0.01
Lead	15.2	0.00213	0.032376	0.000696	0.038	2.64371E-05	0.5	100	0.02077	0.010385	1	0.515	0.083082402	15	0.01	1.5	0.06
Manganese	833	0.00213	1.77429	0.0944	0.038	0.0035872	610	100	0.02077	12.6697	1	0.515	28.05354796	9770	0.00	977	0.03
Molybdenum	0.73	0.00213	0.0015549	NM	0.038	N/A	NM	100	0.02077	N/A	1	0.515	N/A	35.5	N/A	3.55	N/A
Nickel	13.3	0.00213	0.028329	0.0259	0.038	0.000984211	5	100	0.02077	0.10385	1	0.515	0.258569341	79	0.00	57.2	0.00
Selenium	0.085	0.00213	0.00018105	0.0005	0.038	0.000019	0.05	100	0.02077	0.0010385	1	0.515	0.002404951	0.8	0.00	0.4	0.01
Thallium	0.145625	0.00213	0.000310181	0.0015	0.038	0.000057	0.05	100	0.02077	0.0010385	1	0.515	0.002729478	1.2	0.00	0.12	0.02
Uranium	6.955	0.00213	0.01481415	0.0505	0.038	0.001919	4.381676	100	0.02077	0.0910074	1	0.515	0.209204972	1600	0.00	160	0.00
Vanadium	30.8	0.00213	0.065604	0.001365	0.038	5.18581E-05	NM	100	0.02077	N/A	1	0.515	N/A	114	N/A	11.4	N/A
Zinc	51.1	0.00213	0.108843	0.029735	0.038	0.001129935	40	100	0.02077	0.8308	1	0.515	1.826743563	223.5	0.01	10.5	0.17

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 21. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0106				100	0.006236		1	0.0771					
Arsenic	3.8	0.000724	0.0027512	0.0025	0.0106	0.0000265	0.925	3.515	100	0.006236	0.0219195	1	0.0771	0.320327367	22.8	0.01	5.7	0.06
Cadmium	0.34	0.000724	0.00024616	0.00088	0.0106	9.33086E-06	190	64.6	100	0.006236	0.4028456	1	0.0771	5.228289116	3.4	**1.54**	0.85	**6.15**
Chromium	16.7	0.000724	0.0120908	0.002039	0.0106	2.16149E-05	11.416	190.6472	100	0.006236	1.1888759	1	0.0771	15.57702145	5	**3.12**	1	**15.58**
Cobalt	11	0.000724	0.007964	0.000766	0.0106	8.11563E-06	0.321	3.531	100	0.006236	0.0220193	1	0.0771	0.388993925	43.9	0.01	23.1	0.02
Copper	17.5	0.000724	0.01267	0.0044	0.0106	0.00004664	5.492	96.11	100	0.006236	0.599342	1	0.0771	7.938503243	33.2	0.24	26.9	0.30
Lead	15.2	0.000724	0.0110048	0.000696	0.0106	7.37457E-06	228.261	3469.5672	100	0.006236	21.636221	1	0.0771	280.768265	15	**18.72**	1.5	**187.18**
Manganese	833	0.000724	0.603092	0.0944	0.0106	0.00100064	0.228	189.924	100	0.006236	1.1843661	1	0.0771	23.19661095	9770	0.00	977	0.02
Molybdenum	0.73	0.000724	0.00052852	NM	0.0106	N/A	2.091	1.52643	100	0.006236	0.0095188	1	0.0771	0.130315661	35.5	0.00	3.55	0.04
Nickel	13.3	0.000724	0.0096292	0.0259	0.0106	0.000274543	7.802	103.7666	100	0.006236	0.6470885	1	0.0771	8.521300397	79	0.11	57.2	0.15
Selenium	0.085	0.000724	0.00006154	0.0005	0.0106	0.0000053	13.733	1.167305	100	0.006236	0.0072793	1	0.0771	0.095280856	0.8	0.12	0.4	0.24
Thallium	0.145625	0.000724	0.000105433	0.0015	0.0106	0.0000159	1	0.145625	100	0.006236	0.0009081	1	0.0771	0.01335214	1.2	0.01	0.12	0.11
Uranium	6.955	0.000724	0.00503542	0.0505	0.0106	0.0005353	0.063	0.438165	100	0.006236	0.0027324	1	0.0771	0.107692827	1600	0.00	160	0.00
Vanadium	30.8	0.000724	0.0222992	0.001365	0.0106	1.44657E-05	0.088	2.7104	100	0.006236	0.0169021	1	0.0771	0.508634502	114	0.00	11.4	0.04
Zinc	51.1	0.000724	0.0369964	0.029735	0.0106	0.000315192	49.51	2529.961	100	0.006236	15.776837	1	0.0771	205.1121711	223.5	0.92	10.5	**19.53**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 27. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.000111	0.0004218	0.0025	0.0061	0.00001525	19	100	0.004929	0.093651	1	0.0394	2.388021574	9.63	0.25	1.91	**1.25**
Cadmium	0.34	0.000111	0.00003774	0.00088	0.0061	5.36965E-06	4	100	0.004929	0.019716	1	0.0394	0.501500245	2.3	0.22	0.23	**2.18**
Chromium	16.7	0.000111	0.0018537	0.002039	0.0061	1.24388E-05	16	100	0.004929	0.078864	1	0.0394	2.048988294	56.8	0.04	5.68	0.36
Cobalt	11	0.000111	0.001221	0.000766	0.0061	4.67031E-06	15	100	0.004929	0.073935	1	0.0394	1.907631226	20	0.10	5	0.38
Copper	17.5	0.000111	0.0019425	0.0044	0.0061	0.00002684	116	100	0.004929	0.571764	1	0.0394	14.5617599	35.4	0.41	24.3	0.60
Lead	15.2	0.000111	0.0016872	0.000696	0.0061	4.24386E-06	37.9	100	0.004929	0.1868091	1	0.0394	4.784277763	80	0.06	8	0.60
Manganese	833	0.000111	0.092463	0.0944	0.0061	0.00057584	1420	100	0.004929	6.99918	1	0.0394	180.0055543	268	0.67	83	**2.17**
Molybdenum	0.73	0.000111	0.00008103	0	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	13.3	0.000111	0.0014763	0.0259	0.0061	0.000157992	26	100	0.004929	0.128154	1	0.0394	3.29411908	42.1	0.08	23.1	0.14
Selenium	0.085	0.000111	0.000009435	0.0005	0.0061	0.00000305	0.5	100	0.004929	0.0024645	1	0.0394	0.06286764	0.25	0.25	0.025	**2.51**
Thallium	0.145625	0.000111	1.61644E-05	0.0015	0.0061	0.00000915	0.4	100	0.004929	0.0019716	1	0.0394	0.050683106	0.74	0.07	0.074	0.68
Uranium	6.955	0.000111	0.000772005	0.0505	0.0061	0.00030805	876.09	100	0.004929	4.3182427	1	0.0394	109.6274819	5	**21.93**	0.5	**219.25**
Vanadium	30.8	0.000111	0.0034188	0.001365	0.0061	8.32459E-06	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	51.1	0.000111	0.0056721	0.029735	0.0061	0.000181384	147	100	0.004929	0.724563	1	0.0394	18.53848945	225	0.08	22.5	0.82

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 33. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	3.8	0.000111	0.0004218	0.0025	0.0061	0.00001525	4	100	0.004929	0.019716	1	0.0394	0.511498731	9.63	0.05	1.91	0.27
Cadmium	0.34	0.000111	0.00003774	0.00088	0.0061	5.36965E-06	2.1	100	0.004929	0.0103509	1	0.0394	0.263807351	2.3	0.11	0.23	**1.15**
Chromium	16.7	0.000111	0.0018537	0.002039	0.0061	1.24388E-05	0.7	100	0.004929	0.0034503	1	0.0394	0.134934994	56.8	0.00	5.68	0.02
Cobalt	11	0.000111	0.001221	0.000766	0.0061	4.67031E-06	0.3	100	0.004929	0.0014787	1	0.0394	0.06863884	20	0.00	5	0.01
Copper	17.5	0.000111	0.0019425	0.0044	0.0061	0.00002684	5	100	0.004929	0.024645	1	0.0394	0.675490863	35.4	0.02	24.3	0.03
Lead	15.2	0.000111	0.0016872	0.000696	0.0061	4.24386E-06	0.5	100	0.004929	0.0024645	1	0.0394	0.105480809	80	0.00	8	0.01
Manganese	833	0.000111	0.092463	0.0944	0.0061	0.00057584	610	100	0.004929	3.00669	1	0.0394	78.67332081	268	0.29	83	0.95
Molybdenum	0.73	0.000111	0.00008103	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	13.3	0.000111	0.0014763	0.0259	0.0061	0.000157992	5	100	0.004929	0.024645	1	0.0394	0.6669871	42.1	0.02	23.1	0.03
Selenium	0.085	0.000111	0.000009435	0.0005	0.0061	0.00000305	0.05	100	0.004929	0.0002465	1	0.0394	0.006571954	0.25	0.03	0.025	0.26
Thallium	0.145625	0.000111	1.61644E-05	0.0015	0.0061	0.00000915	0.05	100	0.004929	0.0002465	1	0.0394	0.006897573	0.74	0.01	0.074	0.09
Uranium	6.955	0.000111	0.000772005	0.0505	0.0061	0.00030805	4.38	100	0.004929	0.0215973	1	0.0394	0.575566904	5	0.12	0.5	**1.15**
Vanadium	30.8	0.000111	0.0034188	0.001365	0.0061	8.32459E-06	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	51.1	0.000111	0.0056721	0.029735	0.0061	0.000181384	40	100	0.004929	0.19716	1	0.0394	5.152626506	225	0.02	22.5	0.23

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 21. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.083			3.61			100	1.517		1	68.6					
Arsenic	3.8	0.083	0.3154	0.0025	3.61	0.009025	4	100	1.517	6.068	1	68.6	0.093184038	9.63	0.01	1.91	0.05
Cadmium	0.34	0.083	0.02822	0.00088	3.61	0.003177776	2.1	100	1.517	3.1857	1	68.6	0.046896469	2.3	0.02	0.23	0.20
Chromium	16.7	0.083	1.3861	0.002039	3.61	0.007361306	0.7	100	1.517	1.0619	1	68.6	0.035792439	56.8	0.00	5.68	0.01
Cobalt	11	0.083	0.913	0.000766	3.61	0.002763906	0.3	100	1.517	0.4551	1	68.6	0.019983439	20	0.00	5	0.00
Copper	17.5	0.083	1.4525	0.0044	3.61	0.015884	5	100	1.517	7.585	1	68.6	0.131973528	35.4	0.00	24.3	0.01
Lead	15.2	0.083	1.2616	0.000696	3.61	0.002511529	0.5	100	1.517	0.7585	1	68.6	0.029484133	80	0.00	8	0.00
Manganese	833	0.083	69.139	0.0944	3.61	0.340784	610	100	1.517	925.37	1	68.6	14.50218344	268	0.05	83	0.17
Molybdenum	0.73	0.083	0.06059	NM	3.61	N/A	NM	100	1.517	N/A	1	68.6	N/A	1.9	N/A	0.19	N/A
Nickel	13.3	0.083	1.1039	0.0259	3.61	0.093500031	5	100	1.517	7.585	1	68.6	0.128023324	42.1	0.00	23.1	0.01
Selenium	0.085	0.083	0.007055	0.0005	3.61	0.001805	0.05	100	1.517	0.07585	1	68.6	0.00123484	0.25	0.00	0.025	0.05
Thallium	0.145625	0.083	0.012086875	0.0015	3.61	0.005415	0.05	100	1.517	0.07585	1	68.6	0.001360815	0.74	0.00	0.074	0.02
Uranium	6.955	0.083	0.577265	0.0505	3.61	0.182305	4.381676	100	1.517	6.6470025	1	68.6	0.107967529	5	0.02	0.5	0.22
Vanadium	30.8	0.083	2.5564	0.001365	3.61	0.004926522	NM	100	1.517	N/A	1	68.6	N/A	2.1	N/A	0.21	N/A
Zinc	51.1	0.083	4.2413	0.029735	3.61	0.107343838	40	100	1.517	60.68	1	68.6	0.947939415	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 21. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0072			1.02				100	0.2498		1	13.3					
Arsenic	3.8	0.0072	0.02736	0.0025	1.02	0.00255	0.071	0.2698	100	0.2498	0.06739604	1	13.3	0.007316244	9.63	0.00	1.91	0.00
Cadmium	0.34	0.0072	0.002448	0.00088	1.02	0.000897876	69.561	23.65074	100	0.2498	5.90795485	1	13.3	0.444458701	2.3	0.19	0.23	**1.93**
Chromium	16.7	0.0072	0.12024	0.002039	1.02	0.002079926	0.8	13.36	100	0.2498	3.337328	1	13.3	0.260123904	56.8	0.00	5.68	0.05
Cobalt	11	0.0072	0.0792	0.000766	1.02	0.000780938	0.18	1.98	100	0.2498	0.494604	1	13.3	0.043201875	20	0.00	5	0.01
Copper	17.5	0.0072	0.126	0.0044	1.02	0.004488	1.398	24.465	100	0.2498	6.111357	1	13.3	0.469311654	35.4	0.01	24.3	0.02
Lead	15.2	0.0072	0.10944	0.000696	1.02	0.000709629	2.659	40.4168	100	0.2498	10.0961166	1	13.3	0.767388441	80	0.01	8	0.10
Manganese	833	0.0072	5.9976	0.0944	1.02	0.096288	0.079	65.807	100	0.2498	16.4385886	1	13.3	1.694171173	268	0.01	83	0.02
Molybdenum	0.73	0.0072	0.005256	NM	1.02	N/A	1	0.73	100	0.2498	0.182354	1	13.3	0.014106015	1.9	0.01	0.19	0.07
Nickel	13.3	0.0072	0.09576	0.0259	1.02	0.026418291	1.143	15.2019	100	0.2498	3.79743462	1	13.3	0.294707738	42.1	0.01	23.1	0.01
Selenium	0.085	0.0072	0.000612	0.0005	1.02	0.00051	1.754	0.14909	100	0.2498	0.03724268	1	13.3	0.002884563	0.25	0.01	0.025	0.12
Thallium	0.145625	0.0072	0.0010485	0.0015	1.02	0.00153	0.123	0.017911875	100	0.2498	0.00447439	1	13.3	0.000530292	0.74	0.00	0.074	0.01
Uranium	6.955	0.0072	0.050076	0.0505	1.02	0.05151	1	6.955	100	0.2498	1.737359	1	13.3	0.138266541	5	0.03	0.5	0.28
Vanadium	30.8	0.0072	0.22176	0.001365	1.02	0.001391981	0.019	0.5852	100	0.2498	0.14618296	1	13.3	0.027769544	2.1	0.01	0.21	0.13
Zinc	51.1	0.0072	0.36792	0.029735	1.02	0.030329838	16.364	836.2004	100	0.2498	208.88286	1	13.3	15.73542179	225	0.07	22.5	0.70

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 21. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73				100	0.18371		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.8	0.00529	0.020102	0.0025	0.73	0.001825	0.071	0.2698	100	0.18371	0.04956496	1	9.2	0.007770865	9.63	0.00	1.91	0.00
Cadmium	0.34	0.00529	0.0017986	0.00088	0.73	0.000642597	69.561	23.65074	100	0.18371	4.34487745	1	9.2	0.472534635	2.3	0.21	0.23	**2.05**
Chromium	16.7	0.00529	0.088343	0.002039	0.73	0.001488574	0.8	13.36	100	0.18371	2.4543656	1	9.2	0.276543171	56.8	0.00	5.68	0.05
Cobalt	11	0.00529	0.05819	0.000766	0.73	0.000558906	0.18	1.98	100	0.18371	0.3637458	1	9.2	0.045923338	20	0.00	5	0.01
Copper	17.5	0.00529	0.092575	0.0044	0.73	0.003212	1.398	24.465	100	0.18371	4.49446515	1	9.2	0.498940451	35.4	0.01	24.3	0.02
Lead	15.2	0.00529	0.080408	0.000696	0.73	0.000507871	2.659	40.4168	100	0.18371	7.42497033	1	9.2	0.815857196	80	0.01	8	0.10
Manganese	833	0.00529	4.40657	0.0944	0.73	0.068912	0.079	65.807	100	0.18371	12.089404	1	9.2	1.800531084	268	0.01	83	0.02
Molybdenum	0.73	0.00529	0.0038617	NM	0.73	N/A	1	0.73	100	0.18371	0.1341083	1	9.2	0.014996739	1.9	0.01	0.19	0.08
Nickel	13.3	0.00529	0.070357	0.0259	0.73	0.018907209	1.143	15.2019	100	0.18371	2.79274105	1	9.2	0.313261441	42.1	0.01	23.1	0.01
Selenium	0.085	0.00529	0.00044965	0.0005	0.73	0.000365	1.754	0.14909	100	0.18371	0.02738932	1	9.2	0.003065649	0.25	0.01	0.025	0.12
Thallium	0.145625	0.00529	0.000770356	0.0015	0.73	0.001095	0.123	0.017911875	100	0.18371	0.00329059	1	9.2	0.000560429	0.74	0.00	0.074	0.01
Uranium	6.955	0.00529	0.03679195	0.0505	0.73	0.036865	1	6.955	100	0.18371	1.27770305	1	9.2	0.146886957	5	0.03	0.5	0.29
Vanadium	30.8	0.00529	0.162932	0.001365	0.73	0.000996222	0.019	0.5852	100	0.18371	0.10750709	1	9.2	0.029503838	2.1	0.01	0.21	0.14
Zinc	51.1	0.00529	0.270319	0.029735	0.73	0.021706649	16.364	836.2004	100	0.18371	153.618375	1	9.2	16.72939143	225	0.07	22.5	0.74

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
BAF:	Bioaccumulation factor
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PI 21. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231				100	0.002835		1	0.00428					
Arsenic	3.8	0.000155	0.000589	0.0025	0.00231	0.000005775	0.925	3.515	100	0.002835	0.009965	1	0.00428	2.467242991	9.63	0.26	1.91	**1.29**
Cadmium	0.34	0.000155	0.0000527	0.00088	0.00231	2.03342E-06	190	64.6	100	0.002835	0.183141	1	0.00428	42.80274145	2.3	**18.61**	0.23	**186.10**
Chromium	16.7	0.000155	0.0025885	0.002039	0.00231	4.71042E-06	11.416	190.6472	100	0.002835	0.5404848	1	0.00428	126.8873884	56.8	**2.23**	5.68	**22.34**
Cobalt	11	0.000155	0.001705	0.000766	0.00231	1.76859E-06	0.321	3.531	100	0.002835	0.0100104	1	0.00428	2.737652709	20	0.14	5	0.55
Copper	17.5	0.000155	0.0027125	0.0044	0.00231	0.000010164	5.492	96.11	100	0.002835	0.2724719	1	0.00428	64.29778364	35.4	**1.82**	24.3	**2.65**
Lead	15.2	0.000155	0.002356	0.000696	0.00231	1.6071E-06	228.261	3469.5672	100	0.002835	9.836223	1	0.00428	2298.73379	80	**28.73**	8	**287.34**
Manganese	833	0.000155	0.129115	0.0944	0.00231	0.000218064	0.228	189.924	100	0.002835	0.5384345	1	0.00428	156.0204682	268	0.58	83	**1.88**
Molybdenum	0.73	0.000155	0.00011315	NM	0.00231	N/A	2.091	1.52643	100	0.002835	0.0043274	1	0.00428	1.03751847	1.9	0.55	0.19	**5.46**
Nickel	13.3	0.000155	0.0020615	0.0259	0.00231	5.98297E-05	7.802	103.7666	100	0.002835	0.2941783	1	0.00428	69.228888	42.1	**1.64**	23.1	**3.00**
Selenium	0.085	0.000155	0.000013175	0.0005	0.00231	0.000001155	13.733	1.167305	100	0.002835	0.0033093	1	0.00428	0.776551326	0.25	**3.11**	0.025	**31.06**
Thallium	0.145625	0.000155	2.25719E-05	0.0015	0.00231	0.000003465	1	0.145625	100	0.002835	0.0004128	1	0.00428	0.102542932	0.74	0.14	0.074	**1.39**
Uranium	6.955	0.000155	0.001078025	0.0505	0.00231	0.000116655	0.063	0.438165	100	0.002835	0.0012422	1	0.00428	0.569363966	5	0.11	0.5	**1.14**
Vanadium	30.8	0.000155	0.004774	0.001365	0.00231	3.15243E-06	0.088	2.7104	100	0.002835	0.007684	1	0.00428	2.911480474	2.1	**1.39**	0.21	**13.86**
Zinc	51.1	0.000155	0.0079205	0.029735	0.00231	6.86882E-05	49.51	2529.961	100	0.002835	7.1724394	1	0.00428	1677.670239	225	**7.46**	22.5	**74.56**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 21. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Northeast PIA; Water Concentrations from Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000317			0.00229			58		42	0.003183		1	0.0185					
Arsenic	3.8	0.000317	0.0012046	0.0025	0.00229	0.000005725	4	58	2.1	42	0.003183	0.01019197	1	0.0185	0.616340054	9.63	0.06	1.91	0.32
Cadmium	0.34	0.000317	0.00010778	0.00088	0.00229	2.01582E-06	2.1	58	1.3	42	0.003183	0.00561481	1	0.0185	0.30943826	2.3	0.13	0.23	**1.35**
Chromium	16.7	0.000317	0.0052939	0.002039	0.00229	4.66964E-06	0.7	58	2.2	42	0.003183	0.00423339	1	0.0185	0.515241061	56.8	0.01	5.68	0.09
Cobalt	11	0.000317	0.003487	0.000766	0.00229	1.75328E-06	0.3	58	1.26	42	0.003183	0.00223829	1	0.0185	0.309569669	20	0.02	5	0.06
Copper	17.5	0.000317	0.0055475	0.0044	0.00229	0.000010076	5	58	69.1	42	0.003183	0.10160773	1	0.0185	5.792719027	35.4	0.16	24.3	0.24
Lead	15.2	0.000317	0.0048184	0.000696	0.00229	1.59319E-06	0.5	58	3.5	42	0.003183	0.00560208	1	0.0185	0.563355307	80	0.01	8	0.07
Manganese	833	0.000317	0.264061	0.0944	0.00229	0.000216176	610	58	108	42	0.003183	1.27052628	1	0.0185	82.96234897	268	0.31	83	1.00
Molybdenum	0.73	0.000317	0.00023141	NM	0.00229	N/A	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	1.9	N/A	0.19	N/A
Nickel	13.3	0.000317	0.0042161	0.0259	0.00229	5.93117E-05	5	58	2	42	0.003183	0.01190442	1	0.0185	0.874585495	42.1	0.02	23.1	0.04
Selenium	0.085	0.000317	0.000026945	0.0005	0.00229	0.000001145	0.05	58	0.3	42	0.003183	0.00049337	1	0.0185	0.028186757	0.25	0.11	0.025	**1.13**
Thallium	0.145625	0.000317	4.61631E-05	0.0015	0.00229	0.000003435	0.05	58	0.1	42	0.003183	0.00022599	1	0.0185	0.014896818	0.74	0.02	0.074	0.20
Uranium	6.955	0.000317	0.002204735	0.0505	0.00229	0.000115645	4.381676	58	7.52	42	0.003183	0.01814237	1	0.0185	1.106094839	5	0.22	0.5	**2.21**
Vanadium	30.8	0.000317	0.0097636	0.001365	0.00229	3.12513E-06	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	2.1	N/A	0.21	N/A
Zinc	51.1	0.000317	0.0161987	0.029735	0.00229	6.80935E-05	40	58	152	42	0.003183	0.27704832	1	0.0185	15.854871	225	0.07	22.5	0.70

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 22. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.0000142			0.00473			100	0.0148858		1	0.0231					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.81	0.0000142	5.41375E-05	0.0027419	0.00473	1.29691E-05	2.1	100	0.0148858	0.03126018	1	0.0231	1.356159592	22.8	0.06	5.7	0.24
Cadmium	0.19	0.0000142	2.68913E-06	0.0397118	0.00473	0.000187837	1.3	100	0.0148858	0.01935154	1	0.0231	0.845976873	3.4	0.25	0.85	1.00
Chromium	9.90	0.0000142	0.00014058	0.0072406	0.00473	3.42482E-05	2.2	100	0.0148858	0.03274876	1	0.0231	1.425263557	5	0.29	1	**1.43**
Cobalt	6.52	0.0000142	9.25663E-05	0.0515667	0.00473	0.00024391	1.26	100	0.0148858	0.018756108	1	0.0231	0.826518813	43.9	0.02	23.1	0.04
Copper	12.50	0.0000142	0.0001775	0.0508294	0.00473	0.000240423	69.1	100	0.0148858	1.02860878	1	0.0231	44.54661052	33.2	**1.34**	26.9	**1.66**
Lead	13.43	0.0000142	0.000190724	0.0001	0.00473	0.000000473	3.5	100	0.0148858	0.0521003	1	0.0231	2.263701158	15	0.15	1.5	**1.51**
Manganese	543.63	0.0000142	0.007719475	71.524	0.00473	0.33830852	108	100	0.0148858	1.6076664	1	0.0231	84.57551494	9770	0.01	977	0.09
Molybdenum	0.88	0.0000142	1.24694E-05	NM	0.00473	N/A	NM	100	0.0148858	N/A	1	0.0231	N/A	35.5	N/A	3.55	N/A
Nickel	8.90	0.0000142	0.00012638	1.103	0.00473	0.00521719	2	100	0.0148858	0.0297716	1	0.0231	1.520137229	79	0.02	57.2	0.03
Selenium	0.19	0.0000142	2.72463E-06	0.0005	0.00473	0.000002365	0.3	100	0.0148858	0.00446574	1	0.0231	0.193542408	0.8	0.24	0.4	0.48
Thallium	0.13	0.0000142	1.82825E-06	0.00005	0.00473	2.365E-07	0.1	100	0.0148858	0.00148858	1	0.0231	0.064530076	1.2	0.05	0.12	0.54
Uranium	6.16	0.0000142	8.74986E-05	0.366	0.00473	0.00173118	7.52	100	0.0148858	0.111941216	1	0.0231	4.924670763	1600	0.00	160	0.03
Vanadium	21.90	0.0000142	0.00031098	0.0020033	0.00473	9.47577E-06	NM	100	0.0148858	N/A	1	0.0231	N/A	114	N/A	11.4	N/A
Zinc	42.14	0.0000142	0.000598353	1.16	0.00473	0.0054868	152	100	0.0148858	2.2626416	1	0.0231	98.21327933	223.5	0.44	10.5	**9.35**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 22. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Dietary Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			60		40	0.004914		1	0.0218					
Arsenic	3.81	0.000256	0.000976	0.0027419	0.0045	1.23384E-05	4	60	2.1	40	0.004914	0.01592136	1	0.0218	0.77567424	22.8	0.03	5.7	0.14
Cadmium	0.19	0.000256	0.00004848	0.0397118	0.0045	0.000178703	2.1	60	1.3	40	0.004914	0.00874692	1	0.0218	0.411656098	3.4	0.12	0.85	0.48
Chromium	9.90	0.000256	0.0025344	0.0072406	0.0045	3.25828E-05	0.7	60	2.2	40	0.004914	0.0063882	1	0.0218	0.410788202	5	0.08	1	0.41
Cobalt	6.52	0.000256	0.0016688	0.0515667	0.0045	0.00023205	0.3	60	1.26	40	0.004914	0.003361176	1	0.0218	0.241377339	43.9	0.01	23.1	0.01
Copper	12.50	0.000256	0.0032	0.0508294	0.0045	0.000228732	5	60	69.1	40	0.004914	0.15056496	1	0.0218	7.063930842	33.2	0.21	26.9	0.26
Lead	13.43	0.000256	0.0034384	0.0001	0.0045	0.00000045	0.5	60	3.5	40	0.004914	0.0083538	1	0.0218	0.540947248	15	0.04	1.5	0.36
Manganese	543.63	0.000256	0.139168	71.524	0.0045	0.321858	610	60	108	40	0.004914	2.0108088	1	0.0218	113.3869174	9770	0.01	977	0.12
Molybdenum	0.88	0.000256	0.0002248	NM	0.0045	N/A	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	8.90	0.000256	0.0022784	1.103	0.0045	0.0049635	5	60	2	40	0.004914	0.0186732	1	0.0218	1.188766055	79	0.02	57.2	0.02
Selenium	0.19	0.000256	0.00004912	0.0005	0.0045	0.00000225	0.05	60	0.3	40	0.004914	0.0007371	1	0.0218	0.036168349	0.8	0.05	0.4	0.09
Thallium	0.13	0.000256	0.00003296	0.00005	0.0045	0.000000225	0.05	60	0.1	40	0.004914	0.00034398	1	0.0218	0.017301147	1.2	0.01	0.12	0.14
Uranium	6.16	0.000256	0.00157744	0.366	0.0045	0.001647	4.381676	60	7.52	40	0.004914	0.027700246	1	0.0218	1.418563556	1,600	0.00	160	0.01
Vanadium	21.90	0.000256	0.0056064	0.0020033	0.0045	9.015E-06	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	42.14	0.000256	0.0107872	1.16	0.0045	0.00522	40	60	152	40	0.004914	0.4167072	1	0.0218	19.8492844	223.5	0.09	10.5	**1.89**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 22. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			100	0.004914		1	0.0218					
Arsenic	3.81	0.000256	0.000976	0.002742	0.0045	1.23384E-05	4	100	0.004914	0.019656	1	0.0218	0.946988002	22.8	0.04	5.7	0.17
Cadmium	0.19	0.000256	0.00004848	0.039712	0.0045	0.000178703	2.1	100	0.004914	0.0103194	1	0.0218	0.483788208	3.4	0.14	0.85	0.57
Chromium	9.90	0.000256	0.0025344	0.007241	0.0045	3.25828E-05	0.7	100	0.004914	0.0034398	1	0.0218	0.275540496	5	0.06	1	0.28
Cobalt	6.52	0.000256	0.0016688	0.051567	0.0045	0.00023205	0.3	100	0.004914	0.0014742	1	0.0218	0.154818807	43.9	0.00	23.1	0.01
Copper	12.50	0.000256	0.0032	0.050829	0.0045	0.000228732	5	100	0.004914	0.02457	1	0.0218	1.284345521	33.2	0.04	26.9	0.05
Lead	13.43	0.000256	0.0034384	0.0001	0.0045	0.00000045	0.5	100	0.004914	0.002457	1	0.0218	0.270451835	15	0.02	1.5	0.18
Manganese	543.63	0.000256	0.139168	71.524	0.0045	0.321858	610	100	0.004914	2.99754	1	0.0218	158.6498165	9770	0.02	977	0.16
Molybdenum	0.88	0.000256	0.0002248	NM	0.0045	N/A	NM	100	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	8.90	0.000256	0.0022784	1.103	0.0045	0.0049635	5	100	0.004914	0.02457	1	0.0218	1.459261468	79	0.02	57.2	0.03
Selenium	0.19	0.000256	0.00004912	0.0005	0.0045	0.00000225	0.05	100	0.004914	0.0002457	1	0.0218	0.013627064	0.8	0.02	0.4	0.03
Thallium	0.13	0.000256	0.00003296	0.00005	0.0045	0.000000225	0.05	100	0.004914	0.0002457	1	0.0218	0.01279289	1.2	0.01	0.12	0.11
Uranium	6.16	0.000256	0.00157744	0.366	0.0045	0.001647	4.381676	100	0.004914	0.0215316	1	0.0218	1.135596141	1600	0.00	160	0.01
Vanadium	21.90	0.000256	0.0056064	0.002003	0.0045	9.015E-06	NM	100	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	42.14	0.000256	0.0107872	1.16	0.0045	0.00522	40	100	0.004914	0.19656	1	0.0218	9.750788991	223.5	0.04	10.5	0.93

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PP 22. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014				100	0.00792		1	0.117					
Arsenic	3.81	0.00038	0.00144875	0.002742	0.014	3.83863E-05	0.071	0.2706875	100	0.00792	0.00214385	1	0.117	0.031034028	22.8	0.00	5.7	0.01
Cadmium	0.19	0.00038	7.19625E-05	0.039712	0.014	0.000555965	69.561	13.17311438	100	0.00792	0.10433107	1	0.117	0.897085411	3.4	0.26	0.85	**1.06**
Chromium	9.90	0.00038	0.003762	0.007241	0.014	0.000101369	0.8	7.92	100	0.00792	0.0627264	1	0.117	0.569143323	5	0.11	1	0.57
Cobalt	6.52	0.00038	0.002477125	0.051567	0.014	0.000721933	0.18	1.173375	100	0.00792	0.00929313	1	0.117	0.10677084	43.9	0.00	23.1	0.00
Copper	12.50	0.00038	0.00475	0.050829	0.014	0.000711612	1.398	17.475	100	0.00792	0.138402	1	0.117	1.229603519	33.2	0.04	26.9	0.05
Lead	13.43	0.00038	0.005103875	0.0001	0.014	0.0000014	2.659	35.71369375	100	0.00792	0.28285245	1	0.117	2.461177175	15	0.16	1.5	**1.64**
Manganese	543.63	0.00038	0.2065775	71.524	0.014	1.001336	0.079	42.946375	100	0.00792	0.34013529	1	0.117	13.23118624	9770	0.00	977	0.01
Molybdenum	0.88	0.00038	0.000333688	NM	0.014	N/A	1	0.878125	100	0.00792	0.00695475	1	0.117	0.062294338	35.5	0.00	3.55	0.02
Nickel	8.90	0.00038	0.003382	1.103	0.014	0.015442	1.143	10.1727	100	0.00792	0.08056778	1	0.117	0.849502427	79	0.01	57.2	0.01
Selenium	0.19	0.00038	7.29125E-05	0.0005	0.014	0.000007	1.754	0.33654875	100	0.00792	0.00266547	1	0.117	0.023464774	0.8	0.03	0.4	0.06
Thallium	0.13	0.00038	0.000048925	0.00005	0.014	0.0000007	0.123	0.01583625	100	0.00792	0.00012542	1	0.117	0.001496138	1.2	0.00	0.12	0.01
Uranium	6.16	0.00038	0.002341513	0.366	0.014	0.005124	1	6.161875	100	0.00792	0.04880205	1	0.117	0.480919338	1600	0.00	160	0.00
Vanadium	21.90	0.00038	0.008322	0.002003	0.014	2.80467E-05	0.019	0.4161	100	0.00792	0.00329551	1	0.117	0.099534689	114	0.00	11.4	0.01
Zinc	42.14	0.00038	0.01601225	1.16	0.014	0.01624	16.364	689.53805	100	0.00792	5.46114136	1	0.117	46.9520821	223.5	0.21	10.5	**4.47**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 22. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00151			0.075				100	0.03129		1	1.436					
Arsenic	3.81	0.00151	0.005756875	0.002742	0.075	0.000205641	0.071	0.2707	100	0.03129	0.008469812	1	1.436	0.010050367	22.8	0.00	5.7	0.00
Cadmium	0.19	0.00151	0.000285956	0.039712	0.075	0.002978382	69.561	13.1731	100	0.03129	0.412186749	1	1.436	0.289311342	3.4	0.09	0.85	0.34
Chromium	9.90	0.00151	0.014949	0.007241	0.075	0.000543047	0.8	7.9200	100	0.03129	0.2478168	1	1.436	0.183362707	5	0.04	1	0.18
Cobalt	6.52	0.00151	0.009843313	0.051567	0.075	0.0038675	0.18	1.1734	100	0.03129	0.036714904	1	1.436	0.035115401	43.9	0.00	23.1	0.00
Copper	12.50	0.00151	0.018875	0.050829	0.075	0.003812206	1.398	17.4750	100	0.03129	0.54679275	1	1.436	0.396573785	33.2	0.01	26.9	0.01
Lead	13.43	0.00151	0.020281188	0.0001	0.075	0.0000075	2.659	35.7137	100	0.03129	1.117481477	1	1.436	0.792319056	15	0.05	1.5	0.53
Manganese	543.63	0.00151	0.82087375	71.524	0.075	5.3643	0.079	42.9464	100	0.03129	1.343792074	1	1.436	5.243012412	9770	0.00	977	0.01
Molybdenum	0.88	0.00151	0.001325969	NM	0.075	N/A	1	0.8781	100	0.03129	0.027476531	1	1.436	0.020057451	35.5	0.00	3.55	0.01
Nickel	8.90	0.00151	0.013439	1.103	0.075	0.082725	1.143	10.1727	100	0.03129	0.318303783	1	1.436	0.28862659	79	0.00	57.2	0.01
Selenium	0.19	0.00151	0.000289731	0.0005	0.075	0.0000375	1.754	0.3365	100	0.03129	0.01053061	1	1.436	0.007561171	0.8	0.01	0.4	0.02
Thallium	0.13	0.00151	0.000194413	0.00005	0.075	0.00000375	0.123	0.0158	100	0.03129	0.000495516	1	1.436	0.000483063	1.2	0.00	0.12	0.00
Uranium	6.16	0.00151	0.009304431	0.366	0.075	0.02745	1	6.1619	100	0.03129	0.192805069	1	1.436	0.159860376	1600	0.00	160	0.00
Vanadium	21.90	0.00151	0.033069	0.002003	0.075	0.00015025	0.019	0.4161	100	0.03129	0.013019769	1	1.436	0.032199874	114	0.00	11.4	0.00
Zinc	42.14	0.00151	0.063627625	1.16	0.075	0.087	16.364	689.5381	100	0.03129	21.57564558	1	1.436	15.12971672	223.5	0.07	10.5	**1.44**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 22. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038			100	0.02077		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.81	0.00213	0.008120625	0.002742	0.038	0.000104191	4	100	0.02077	0.08308	1	0.515	0.177290905	22.8	0.01	5.7	0.03
Cadmium	0.19	0.00213	0.000403369	0.039712	0.038	0.001509047	2.1	100	0.02077	0.043617	1	0.515	0.088406633	3.4	0.03	0.85	0.10
Chromium	9.90	0.00213	0.021087	0.007241	0.038	0.000275144	0.7	100	0.02077	0.014539	1	0.515	0.069710959	5	0.01	1	0.07
Cobalt	6.52	0.00213	0.013884938	0.051567	0.038	0.001959533	0.3	100	0.02077	0.006231	1	0.515	0.042864992	43.9	0.00	23.1	0.00
Copper	12.50	0.00213	0.026625	0.050829	0.038	0.001931518	5	100	0.02077	0.10385	1	0.515	0.257100034	33.2	0.01	26.9	0.01
Lead	13.43	0.00213	0.028608563	0.0001	0.038	0.0000038	0.5	100	0.02077	0.010385	1	0.515	0.075723034	15	0.01	1.5	0.05
Manganese	543.63	0.00213	1.15792125	71.524	0.038	2.717912	610	100	0.02077	12.6697	1	0.515	32.12724903	9770	0.00	977	0.03
Molybdenum	0.88	0.00213	0.001870406	NM	0.038	N/A	NM	100	0.02077	N/A	1	0.515	N/A	35.5	N/A	3.55	N/A
Nickel	8.90	0.00213	0.018957	1.103	0.038	0.041914	5	100	0.02077	0.10385	1	0.515	0.319846602	79	0.00	57.2	0.01
Selenium	0.19	0.00213	0.000408694	0.0005	0.038	0.000019	0.05	100	0.02077	0.0010385	1	0.515	0.002846978	0.8	0.00	0.4	0.01
Thallium	0.13	0.00213	0.000274238	0.00005	0.038	0.0000019	0.05	100	0.02077	0.0010385	1	0.515	0.002552694	1.2	0.00	0.12	0.02
Uranium	6.16	0.00213	0.013124794	0.366	0.038	0.013908	4.381676	100	0.02077	0.0910074	1	0.515	0.22920428	1600	0.00	160	0.00
Vanadium	21.90	0.00213	0.046647	0.002003	0.038	7.61267E-05	NM	100	0.02077	N/A	1	0.515	N/A	114	N/A	11.4	N/A
Zinc	42.14	0.00213	0.089752875	1.16	0.038	0.04408	40	100	0.02077	0.8308	1	0.515	1.873073544	223.5	0.01	10.5	0.18

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PM 22. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0106				100	0.006236		1	0.0771					
Arsenic	3.81	0.000724	0.00276025	0.002742	0.0106	2.90639E-05	0.925	3.5265625	100	0.006236	0.0219916	1	0.0771	0.321413199	22.8	0.01	5.7	0.06
Cadmium	0.19	0.000724	0.000137108	0.039712	0.0106	0.000420945	190	35.98125	100	0.006236	0.2243791	1	0.0771	2.917472467	3.4	0.86	0.85	**3.43**
Chromium	9.90	0.000724	0.0071676	0.007241	0.0106	7.67506E-05	11.416	113.0184	100	0.006236	0.7047827	1	0.0771	9.235111453	5	**1.85**	1	**9.24**
Cobalt	6.52	0.000724	0.004719575	0.051567	0.0106	0.000546607	0.321	2.09251875	100	0.006236	0.0130489	1	0.0771	0.237550306	43.9	0.01	23.1	0.01
Copper	12.50	0.000724	0.00905	0.050829	0.0106	0.000538792	5.492	68.65	100	0.006236	0.4281014	1	0.0771	5.676915587	33.2	0.17	26.9	0.21
Lead	13.43	0.000724	0.009724225	0.0001	0.0106	0.00000106	228.261	3065.83056	100	0.006236	19.118519	1	0.0771	248.0965582	15	**16.54**	1.5	**165.40**
Manganese	543.63	0.000724	0.3935845	71.524	0.0106	0.7581544	0.228	123.9465	100	0.006236	0.7729304	1	0.0771	24.96328501	9770	0.00	977	0.03
Molybdenum	0.88	0.000724	0.000635763	NM	0.0106	N/A	2.091	1.83615938	100	0.006236	0.0114503	1	0.0771	0.156758137	35.5	0.00	3.55	0.04
Nickel	8.90	0.000724	0.0064436	1.103	0.0106	0.0116918	7.802	69.4378	100	0.006236	0.4330141	1	0.0771	5.851485354	79	0.07	57.2	0.10
Selenium	0.19	0.000724	0.000138918	0.0005	0.0106	0.0000053	13.733	2.63501938	100	0.006236	0.016432	1	0.0771	0.214996087	0.8	0.27	0.4	0.54
Thallium	0.13	0.000724	0.000093215	0.00005	0.0106	0.00000053	1	0.12875	100	0.006236	0.0008029	1	0.0771	0.011629442	1.2	0.01	0.12	0.10
Uranium	6.16	0.000724	0.004461198	0.366	0.0106	0.0038796	0.063	0.38819813	100	0.006236	0.0024208	1	0.0771	0.13957978	1600	0.00	160	0.00
Vanadium	21.90	0.000724	0.0158556	0.002003	0.0106	2.12353E-05	0.088	1.9272	100	0.006236	0.012018	1	0.0771	0.361800967	114	0.00	11.4	0.03
Zinc	42.14	0.000724	0.03050755	1.16	0.0106	0.012296	49.51	2086.22763	100	0.006236	13.009715	1	0.0771	169.2933725	223.5	0.76	10.5	**16.12**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 28. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	3.81	0.000111	0.000423188	0.002742	0.0061	1.67254E-05	19	100	0.004929	0.093651	1	0.0394	2.388094237	9.63	0.25	1.91	**1.25**
Cadmium	0.19	0.000111	2.10206E-05	0.039712	0.0061	0.000242242	4	100	0.004929	0.019716	1	0.0394	0.507087878	2.3	0.22	0.23	**2.20**
Chromium	9.90	0.000111	0.0010989	0.007241	0.0061	4.41678E-05	16	100	0.004929	0.078864	1	0.0394	2.030636239	56.8	0.04	5.68	0.36
Cobalt	6.52	0.000111	0.000723581	0.051567	0.0061	0.000314557	15	100	0.004929	0.073935	1	0.0394	1.902871521	20	0.10	5	0.38
Copper	12.50	0.000111	0.0013875	0.050829	0.0061	0.000310059	116	100	0.004929	0.571764	1	0.0394	14.55486191	35.4	0.41	24.3	0.60
Lead	13.43	0.000111	0.001490869	0.0001	0.0061	0.00000061	37.9	100	0.004929	0.1868091	1	0.0394	4.779202506	80	0.06	8	0.60
Manganese	543.63	0.000111	0.060342375	71.524	0.0061	0.4362964	1420	100	0.004929	6.99918	1	0.0394	190.2492075	268	0.71	83	**2.29**
Molybdenum	0.88	0.000111	9.74719E-05	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	8.90	0.000111	0.0009879	1.103	0.0061	0.0067283	26	100	0.004929	0.128154	1	0.0394	3.448482234	42.1	0.08	23.1	0.15
Selenium	0.19	0.000111	2.12981E-05	0.0005	0.0061	0.00000305	0.5	100	0.004929	0.0024645	1	0.0394	0.063168734	0.25	0.25	0.025	**2.53**
Thallium	0.13	0.000111	1.42913E-05	0.00005	0.0061	0.000000305	0.4	100	0.004929	0.0019716	1	0.0394	0.050411072	0.74	0.07	0.074	0.68
Uranium	6.16	0.000111	0.000683968	0.366	0.0061	0.0022326	876.08901	100	0.004929	4.3182427	1	0.0394	109.6740939	5	**21.93**	0.5	**219.35**
Vanadium	21.90	0.000111	0.0024309	0.002003	0.0061	1.22203E-05	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	42.14	0.000111	0.004677263	1.16	0.0061	0.007076	147	100	0.004929	0.724563	1	0.0394	18.68823001	225	0.08	22.5	0.83

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 34. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	3.81	0.000111	0.000423188	0.002742	0.0061	1.67254E-05	4	100	0.004929	0.019716	1	0.0394	0.511571394	9.63	0.05	1.91	0.27
Cadmium	0.19	0.000111	2.10206E-05	0.039712	0.0061	0.000242242	2.1	100	0.004929	0.0103509	1	0.0394	0.269394985	2.3	0.12	0.23	**1.17**
Chromium	9.90	0.000111	0.0010989	0.007241	0.0061	4.41678E-05	0.7	100	0.004929	0.0034503	1	0.0394	0.116582939	56.8	0.00	5.68	0.02
Cobalt	6.52	0.000111	0.000723581	0.051567	0.0061	0.000314557	0.3	100	0.004929	0.0014787	1	0.0394	0.063879135	20	0.00	5	0.01
Copper	12.50	0.000111	0.0013875	0.050829	0.0061	0.000310059	5	100	0.004929	0.024645	1	0.0394	0.668592878	35.4	0.02	24.3	0.03
Lead	13.43	0.000111	0.001490869	0.0001	0.0061	0.00000061	0.5	100	0.004929	0.0024645	1	0.0394	0.100405552	80	0.00	8	0.01
Manganese	543.63	0.000111	0.060342375	71.524	0.0061	0.4362964	610	100	0.004929	3.00669	1	0.0394	88.91697398	268	0.33	83	**1.07**
Molybdenum	0.88	0.000111	9.74719E-05	NM	0.0061	N/A	NN	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	8.90	0.000111	0.0009879	1.103	0.0061	0.0067283	5	100	0.004929	0.024645	1	0.0394	0.821350254	42.1	0.02	23.1	0.04
Selenium	0.19	0.000111	2.12981E-05	0.0005	0.0061	0.00000305	0.05	100	0.004929	0.0002465	1	0.0394	0.006873049	0.25	0.03	0.025	0.27
Thallium	0.13	0.000111	1.42913E-05	0.00005	0.0061	0.000000305	0.05	100	0.004929	0.0002465	1	0.0394	0.006625539	0.74	0.01	0.074	0.09
Uranium	6.16	0.000111	0.000683968	0.366	0.0061	0.0022326	4.381676	100	0.004929	0.0215973	1	0.0394	0.622178912	5	0.12	0.5	**1.24**
Vanadium	21.90	0.000111	0.0024309	0.002003	0.0061	1.22203E-05	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	42.14	0.000111	0.004677263	1.16	0.0061	0.007076	40	100	0.004929	0.19716	1	0.0394	5.302367069	225	0.02	22.5	0.24

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 22. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.083			3.61			100	1.517		1	68.6					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.81	0.083	0.3164375	0.002742	3.61	0.009898169	4	100	1.517	6.068	1	68.6	0.09321189	9.63	0.01	1.91	0.05
Cadmium	0.19	0.083	0.015718125	0.039712	3.61	0.143359471	2.1	100	1.517	3.1857	1	68.6	0.048757691	2.3	0.02	0.23	0.21
Chromium	9.90	0.083	0.8217	0.007241	3.61	0.026138656	0.7	100	1.517	1.0619	1	68.6	0.027838756	56.8	0.00	5.68	0.00
Cobalt	6.52	0.083	0.54105625	0.051567	3.61	0.186155667	0.3	100	1.517	0.4551	1	68.6	0.017234868	20	0.00	5	0.00
Copper	12.50	0.083	1.0375	0.050829	3.61	0.183494176	5	100	1.517	7.585	1	68.6	0.128367262	35.4	0.00	24.3	0.01
Lead	13.43	0.083	1.11479375	0.0001	3.61	0.000361	0.5	100	1.517	0.7585	1	68.6	0.027312751	80	0.00	8	0.00
Manganese	543.63	0.083	45.120875	71.524	3.61	258.20164	610	100	1.517	925.37	1	68.6	17.91096961	268	0.07	83	0.22
Molybdenum	0.88	0.083	0.072884375	NM	3.61	N/A	NM	100	1.517	N/A	1	68.6	N/A	1.9	N/A	0.19	N/A
Nickel	8.90	0.083	0.7387	1.103	3.61	3.98183	5	100	1.517	7.585	1	68.6	0.179380904	42.1	0.00	23.1	0.01
Selenium	0.19	0.083	0.015925625	0.0005	3.61	0.001805	0.05	100	1.517	0.07585	1	68.6	0.001364149	0.25	0.01	0.025	0.05
Thallium	0.13	0.083	0.01068625	0.00005	3.61	0.0001805	0.05	100	1.517	0.07585	1	68.6	0.001264093	0.74	0.00	0.074	0.02
Uranium	6.16	0.083	0.511435625	0.366	3.61	1.32126	4.381676	100	1.517	6.6470025	1	68.6	0.12361076	5	0.02	0.5	0.25
Vanadium	21.90	0.083	1.8177	0.002003	3.61	0.007232033	NM	100	1.517	N/A	1	68.6	N/A	2.1	N/A	0.21	N/A
Zinc	42.14	0.083	3.4974125	1.16	3.61	4.1876	40	100	1.517	60.68	1	68.6	0.996574526	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 22. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0072			1.02				100	0.2498		1	13.3					
Arsenic	3.81	0.0072	0.02745	0.002742	1.02	0.002796713	0.071	0.2706875	100	0.2498	0.06761774	1	13.3	0.007358229	9.63	0.00	1.91	0.00
Cadmium	0.19	0.0072	0.0013635	0.039712	1.02	0.040506	69.561	13.17311438	100	0.2498	3.29064397	1	13.3	0.250564923	2.3	0.11	0.23	**1.09**
Chromium	9.90	0.0072	0.07128	0.007241	1.02	0.007385438	0.8	7.92	100	0.2498	1.978416	1	13.3	0.154667777	56.8	0.00	5.68	0.03
Cobalt	6.52	0.0072	0.046935	0.051567	1.02	0.052598	0.18	1.173375	100	0.2498	0.29310908	1	13.3	0.029521961	20	0.00	5	0.01
Copper	12.50	0.0072	0.09	0.050829	1.02	0.051846	1.398	17.475	100	0.2498	4.365255	1	13.3	0.338879774	35.4	0.01	24.3	0.01
Lead	13.43	0.0072	0.096705	0.0001	1.02	0.000102	2.659	35.71369375	100	0.2498	8.9212807	1	13.3	0.678051707	80	0.01	8	0.08
Manganese	543.63	0.0072	3.9141	71.524	1.02	72.95448	0.079	42.946375	100	0.2498	10.7280045	1	13.3	6.586209359	268	0.02	83	0.08
Molybdenum	0.88	0.0072	0.0063225	NM	1.02	N/A	1	0.878125	100	0.2498	0.21935563	1	13.3	0.01696828	1.9	0.01	0.19	0.09
Nickel	8.90	0.0072	0.06408	1.103	1.02	1.12506	1.143	10.1727	100	0.2498	2.54114046	1	13.3	0.280472215	42.1	0.01	23.1	0.01
Selenium	0.19	0.0072	0.0013815	0.0005	1.02	0.00051	1.754	0.33654875	100	0.2498	0.08406988	1	13.3	0.006463261	0.25	0.03	0.025	0.26
Thallium	0.13	0.0072	0.000927	0.00005	1.02	0.000051	0.123	0.01583625	100	0.2498	0.0039559	1	13.3	0.00037097	0.74	0.00	0.074	0.01
Uranium	6.16	0.0072	0.0443655	0.366	1.02	0.37332	1	6.161875	100	0.2498	1.53923638	1	13.3	0.147136983	5	0.03	0.5	0.29
Vanadium	21.90	0.0072	0.15768	0.002003	1.02	0.0020434	0.019	0.4161	100	0.2498	0.10394178	1	13.3	0.01982445	2.1	0.01	0.21	0.09
Zinc	42.14	0.0072	0.30339	1.16	1.02	1.1832	16.364	689.53805	100	0.2498	172.246605	1	13.3	13.06264623	225	0.06	22.5	0.58

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 22. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00529			0.73				100	0.18371		1	9.2					
Arsenic	3.81	0.00529	0.020168125	0.0027	0.73	0.002001569	0.071	0.2706875	100	0.18371	0.049728	1	9.2	0.007814967	9.63	0.00	1.91	0.00
Cadmium	0.19	0.00529	0.001001794	0.0397	0.73	0.028989588	69.561	13.17311438	100	0.18371	2.42003284	1	9.2	0.266306981	2.3	0.12	0.23	**1.16**
Chromium	9.90	0.00529	0.052371	0.0072	0.73	0.005285656	0.8	7.92	100	0.18371	1.4549832	1	9.2	0.164417376	56.8	0.00	5.68	0.03
Cobalt	6.52	0.00529	0.034484188	0.0516	0.73	0.037643667	0.18	1.173375	100	0.18371	0.21556072	1	9.2	0.031270497	20	0.00	5	0.01
Copper	12.50	0.00529	0.066125	0.0508	0.73	0.037105471	1.398	17.475	100	0.18371	3.21033225	1	9.2	0.360169861	35.4	0.01	24.3	0.01
Lead	13.43	0.00529	0.071051313	0.0001	0.73	0.000073	2.659	35.71369375	100	0.18371	6.56096268	1	9.2	0.720879021	80	0.01	8	0.09
Manganese	543.63	0.00529	2.87577625	71.524	0.73	52.21252	0.079	42.946375	100	0.18371	7.88967855	1	9.2	6.845432044	268	0.03	83	0.08
Molybdenum	0.88	0.00529	0.004645281	NM	0.73	N/A	1	0.878125	100	0.18371	0.16132034	1	9.2	0.018039742	1.9	0.01	0.19	0.09
Nickel	8.90	0.00529	0.047081	1.103	0.73	0.80519	1.143	10.1727	100	0.18371	1.86882672	1	9.2	0.295771491	42.1	0.01	23.1	0.01
Selenium	0.19	0.00529	0.001015019	0.0005	0.73	0.000365	1.754	0.33654875	100	0.18371	0.06182737	1	9.2	0.006870368	0.25	0.03	0.025	0.27
Thallium	0.13	0.00529	0.000681088	0.00005	0.73	0.0000365	0.123	0.01583625	100	0.18371	0.00290928	1	9.2	0.000394224	0.74	0.00	0.074	0.01
Uranium	6.16	0.00529	0.032596319	0.366	0.73	0.26718	1	6.161875	100	0.18371	1.13199806	1	9.2	0.155627649	5	0.03	0.5	0.31
Vanadium	21.90	0.00529	0.115851	0.002	0.73	0.001462433	0.019	0.4161	100	0.18371	0.07644173	1	9.2	0.021060344	2.1	0.01	0.21	0.10
Zinc	42.14	0.00529	0.222907375	1.16	0.73	0.8468	16.364	689.53805	100	0.18371	126.675035	1	9.2	13.8852981	225	0.06	22.5	0.62

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 22. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000155			0.00231				100	0.002835		1	0.00428					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.81	0.000155	0.000590938	0.002742	0.00231	6.33373E-06	0.925	3.5265625	100	0.002835	0.0099978	1	0.00428	2.475485028	9.63	0.26	1.91	**1.30**
Cadmium	0.19	0.000155	2.93531E-05	0.039712	0.00231	9.17342E-05	190	35.98125	100	0.002835	0.1020068	1	0.00428	23.86166613	2.3	**10.37**	0.23	**103.75**
Chromium	9.90	0.000155	0.0015345	0.007241	0.00231	1.67258E-05	11.416	113.0184	100	0.002835	0.3204072	1	0.00428	75.22392286	56.8	**1.32**	5.68	**13.24**
Cobalt	6.52	0.000155	0.001010406	0.051567	0.00231	0.000119119	0.321	2.09251875	100	0.002835	0.0059323	1	0.00428	1.649956987	20	0.08	5	0.33
Copper	12.50	0.000155	0.0019375	0.050829	0.00231	0.000117416	5.492	68.65	100	0.002835	0.1946228	1	0.00428	45.95272569	35.4	**1.30**	24.3	**1.89**
Lead	13.43	0.000155	0.002081844	0.0001	0.00231	0.000000231	228.261	3065.83056	100	0.002835	8.6916296	1	0.00428	2031.241052	80	**25.39**	8	**253.91**
Manganese	543.63	0.000155	0.084261875	71.524	0.00231	0.16522044	0.228	123.9465	100	0.002835	0.3513883	1	0.00428	140.390337	268	0.52	83	**1.69**
Molybdenum	0.88	0.000155	0.000136109	NM	0.00231	N/A	2.091	1.83615938	100	0.002835	0.0052055	1	0.00428	1.248042337	1.9	0.66	0.19	**6.57**
Nickel	8.90	0.000155	0.0013795	1.103	0.00231	0.00254793	7.802	69.4378	100	0.002835	0.1968562	1	0.00428	46.91205444	42.1	**1.11**	23.1	**2.03**
Selenium	0.19	0.000155	2.97406E-05	0.0005	0.00231	0.000001155	13.733	2.63501938	100	0.002835	0.0074703	1	0.00428	1.752611111	0.25	**7.01**	0.025	**70.10**
Thallium	0.13	0.000155	1.99563E-05	0.00005	0.00231	1.155E-07	1	0.12875	100	0.002835	0.000365	1	0.00428	0.089971495	0.74	0.12	0.074	**1.22**
Uranium	6.16	0.000155	0.000955091	0.366	0.00231	0.00084546	0.063	0.38819813	100	0.002835	0.0011005	1	0.00428	0.677825306	5	0.14	0.5	**1.36**
Vanadium	21.90	0.000155	0.0033945	0.002003	0.00231	4.6277E-06	0.088	1.9272	100	0.002835	0.0054636	1	0.00428	2.070733575	2.1	0.99	0.21	**9.86**
Zinc	42.14	0.000155	0.006531313	1.16	0.00231	0.0026796	49.51	2086.22763	100	0.002835	5.9144553	1	0.00428	1384.034166	225	**6.15**	22.5	**61.51**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 22. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: Southwest PIA; Water Concentrations from Central Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229			58		42	0.003183		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	3.81	0.000317	0.001208563	0.002742	0.00229	6.27889E-06	4	58	2.1	42	0.003183	0.01019197	1	0.0185	0.616584183	9.63	0.06	1.91	0.32
Cadmium	0.19	0.000317	6.00319E-05	0.039712	0.00229	9.09399E-05	2.1	58	1.3	42	0.003183	0.00561481	1	0.0185	0.31166399	2.3	0.14	0.23	**1.36**
Chromium	9.90	0.000317	0.0031383	0.007241	0.00229	1.6581E-05	0.7	58	2.2	42	0.003183	0.00423339	1	0.0185	0.399366002	56.8	0.01	5.68	0.07
Cobalt	6.52	0.000317	0.002066444	0.051567	0.00229	0.000118088	0.3	58	1.26	42	0.003183	0.00223829	1	0.0185	0.23907119	20	0.01	5	0.05
Copper	12.50	0.000317	0.0039625	0.050829	0.00229	0.000116399	5	58	69.1	42	0.003183	0.10160773	1	0.0185	5.71279056	35.4	0.16	24.3	0.24
Lead	13.43	0.000317	0.004257706	0.0001	0.00229	0.000000229	0.5	58	3.5	42	0.003183	0.00560208	1	0.0185	0.532973797	80	0.01	8	0.07
Manganese	543.63	0.000317	0.172329125	71.524	0.00229	0.16378996	610	58	108	42	0.003183	1.27052628	1	0.0185	86.84569541	268	0.32	83	**1.05**
Molybdenum	0.88	0.000317	0.000278366	NM	0.00229	N/A	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	1.9	N/A	0.19	N/A
Nickel	8.90	0.000317	0.0028213	1.103	0.00229	0.00252587	5	58	2	42	0.003183	0.01190442	1	0.0185	0.932518378	42.1	0.02	23.1	0.04
Selenium	0.19	0.000317	6.08244E-05	0.0005	0.00229	0.000001145	0.05	58	0.3	42	0.003183	0.00049337	1	0.0185	0.030018074	0.25	0.12	0.025	**1.20**
Thallium	0.13	0.000317	4.08138E-05	0.00005	0.00229	1.145E-07	0.05	58	0.1	42	0.003183	0.00022599	1	0.0185	0.014428176	0.74	0.02	0.074	0.19
Uranium	6.16	0.000317	0.001953314	0.366	0.00229	0.00083814	4.381676	58	7.52	42	0.003183	0.01814237	1	0.0185	1.131558319	5	0.23	0.5	**2.26**
Vanadium	21.90	0.000317	0.0069423	0.002003	0.00229	4.58763E-06	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	2.1	N/A	0.21	N/A
Zinc	42.14	0.000317	0.013357588	1.16	0.00229	0.0026564	40	58	152	42	0.003183	0.27704832	1	0.0185	15.84120581	225	0.07	22.5	0.70

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PJ 24. Hazard Quotient Calculations for an Insectivorous Bird (Cliff Swallow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Invertebrates, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day w.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day w.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0000142			0.00473			100	0.0148858		1	0.0231					
Arsenic	11.7	0.0000142	0.00016614	0.0043525	0.00473	2.05873E-05	2.1	100	0.0148858	0.03126018	1	0.0231	1.361337979	22.8	0.06	5.7	0.24
Cadmium	0.303	0.0000142	4.3026E-06	0.0029294	0.00473	1.38561E-05	1.3	100	0.0148858	0.01935154	1	0.0231	0.838515096	3.4	0.25	0.85	0.99
Chromium	10.44	0.0000142	0.000148248	0.0019875	0.00473	9.40088E-06	2.2	100	0.0148858	0.03274876	1	0.0231	1.424519865	5	0.28	1	**1.42**
Cobalt	6.38	0.0000142	0.000090596	0.0044	0.00473	0.000020812	1.26	100	0.0148858	0.018756108	1	0.0231	0.816775584	43.9	0.02	23.1	0.04
Copper	21.14	0.0000142	0.000300188	0.0471624	0.00473	0.000223078	69.1	100	0.0148858	1.02860878	1	0.0231	44.55117082	33.2	**1.34**	26.9	**1.66**
Lead	14.22	0.0000142	0.000201924	0.0005344	0.00473	2.52759E-06	3.5	100	0.0148858	0.0521003	1	0.0231	2.264274961	15	0.15	1.5	**1.51**
Manganese	748.8	0.0000142	0.01063296	8.719	0.00473	0.04124087	108	100	0.0148858	1.6076664	1	0.0231	71.8415684	9770	0.01	977	0.07
Molybdenum	2.654	0.0000142	3.76868E-05	NM	0.00473	N/A	NM	100	0.0148858	N/A	1	0.0231	N/A	35.5	N/A	3.55	N/A
Nickel	8.92	0.0000142	0.000126664	0.2427688	0.00473	0.001148296	2	100	0.0148858	0.0297716	1	0.0231	1.344006935	79	0.02	57.2	0.02
Selenium	0.085	0.0000142	0.000001207	0.001	0.00473	0.00000473	0.3	100	0.0148858	0.00446574	1	0.0231	0.193579091	0.8	0.24	0.4	0.48
Thallium	0.24	0.0000142	0.000003408	0.0003	0.00473	0.000001419	0.1	100	0.0148858	0.00148858	1	0.0231	0.064649654	1.2	0.05	0.12	0.54
Uranium	93.675	0.0000142	0.001330185	0.1	0.00473	0.000473	7.52	100	0.0148858	0.111941216	1	0.0231	4.924000043	1600	0.00	160	0.03
Vanadium	23.26	0.0000142	0.000330292	0.00025	0.00473	1.1825E-06	NM	100	0.0148858	N/A	1	0.0231	N/A	114	N/A	11.4	N/A
Zinc	55.42	0.0000142	0.000786964	0.2980588	0.00473	0.001409818	152	100	0.0148858	2.2626416	1	0.0231	98.04495161	223.5	0.44	10.5	**9.34**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
w.w.: Wet weight
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PT 24. Hazard Quotient Calculations for an Onmivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000256			0.0045			60		40	0.004914		1	0.0218					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000256	0.0029952	0.0043525	0.0045	1.95863E-05	4	60	2.1	40	0.004914	0.01592136	1	0.0218	0.868630562	22.8	0.04	5.7	0.15
Cadmium	0.303	0.000256	0.000077568	0.0029294	0.0045	1.31824E-05	2.1	60	1.3	40	0.004914	0.00874692	1	0.0218	0.405397723	3.4	0.12	0.85	0.48
Chromium	10.44	0.000256	0.00267264	0.0019875	0.0045	8.94375E-06	0.7	60	2.2	40	0.004914	0.0063882	1	0.0218	0.416045126	5	0.08	1	0.42
Cobalt	6.38	0.000256	0.00163328	0.0044	0.0045	0.0000198	0.3	60	1.26	40	0.004914	0.003361176	1	0.0218	0.230011743	43.9	0.01	23.1	0.01
Copper	21.14	0.000256	0.00541184	0.0471624	0.0045	0.000212231	5	60	69.1	40	0.004914	0.15056496	1	0.0218	7.164634431	33.2	0.22	26.9	0.27
Lead	14.22	0.000256	0.00364032	0.0005344	0.0045	2.40469E-06	0.5	60	3.5	40	0.004914	0.0083538	1	0.0218	0.550299298	15	0.04	1.5	0.37
Manganese	748.8	0.000256	0.1916928	8.719	0.0045	0.0392355	610	60	108	40	0.004914	2.0108088	1	0.0218	102.8319771	9770	0.01	977	0.11
Molybdenum	2.654	0.000256	0.000679424	NM	0.0045	N/A	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	8.92	0.000256	0.00228352	0.2427688	0.0045	0.001092459	5	60	2	40	0.004914	0.0186732	1	0.0218	1.011430247	79	0.01	57.2	0.02
Selenium	0.085	0.000256	0.00002176	0.001	0.0045	0.0000045	0.05	60	0.3	40	0.004914	0.0007371	1	0.0218	0.035016514	0.8	0.04	0.4	0.09
Thallium	0.24	0.000256	0.00006144	0.0003	0.0045	0.00000135	0.05	60	0.1	40	0.004914	0.00034398	1	0.0218	0.018659174	1.2	0.02	0.12	0.16
Uranium	93.675	0.000256	0.0239808	0.1	0.0045	0.00045	4.381676	60	7.52	40	0.004914	0.027700246	1	0.0218	2.391332363	1,600	0.00	160	0.01
Vanadium	23.26	0.000256	0.00595456	0.00025	0.0045	0.000001125	NM	60	NM	40	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	55.42	0.000256	0.01418752	0.2980588	0.0045	0.001341265	40	60	152	40	0.004914	0.4167072	1	0.0218	19.82733875	223.5	0.09	10.5	**1.89**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PL 24. Hazard Quotient Calculations for a Herbivorous Bird (Song Sparrow)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000256			0.0045			100	0.004914		1	0.0218					
Arsenic	11.7	0.000256	0.0029952	0.004353	0.0045	1.95863E-05	4	100	0.004914	0.019656	1	0.0218	1.039944323	22.8	0.05	5.7	0.18
Cadmium	0.303	0.000256	0.000077568	0.002929	0.0045	1.31824E-05	2.1	100	0.004914	0.0103194	1	0.0218	0.477529833	3.4	0.14	0.85	0.56
Chromium	10.44	0.000256	0.00267264	0.001988	0.0045	8.94375E-06	0.7	100	0.004914	0.0034398	1	0.0218	0.28079742	5	0.06	1	0.28
Cobalt	6.38	0.000256	0.00163328	0.0044	0.0045	0.0000198	0.3	100	0.004914	0.0014742	1	0.0218	0.143453211	43.9	0.00	23.1	0.01
Copper	21.14	0.000256	0.00541184	0.047162	0.0045	0.000212231	5	100	0.004914	0.02457	1	0.0218	1.38504911	33.2	0.04	26.9	0.05
Lead	14.22	0.000256	0.00364032	0.000534	0.0045	2.40469E-06	0.5	100	0.004914	0.002457	1	0.0218	0.279803885	15	0.02	1.5	0.19
Manganese	748.8	0.000256	0.1916928	8.719	0.0045	0.0392355	610	100	0.004914	2.99754	1	0.0218	148.0948761	9770	0.02	977	0.15
Molybdenum	2.654	0.000256	0.000679424	NM	0.0045	N/A	NM	100	0.004914	N/A	1	0.0218	N/A	35.5	N/A	3.55	N/A
Nickel	8.92	0.000256	0.00228352	0.242769	0.0045	0.001092459	5	100	0.004914	0.02457	1	0.0218	1.281925659	79	0.02	57.2	0.02
Selenium	0.085	0.000256	0.00002176	0.001	0.0045	0.0000045	0.05	100	0.004914	0.0002457	1	0.0218	0.012475229	0.8	0.02	0.4	0.03
Thallium	0.24	0.000256	0.00006144	0.0003	0.0045	0.00000135	0.05	100	0.004914	0.0002457	1	0.0218	0.014150917	1.2	0.01	0.12	0.12
Uranium	93.675	0.000256	0.0239808	0.1	0.0045	0.00045	4.381676	100	0.004914	0.0215316	1	0.0218	2.108364948	1600	0.00	160	0.01
Vanadium	23.26	0.000256	0.00595456	0.00025	0.0045	0.000001125	NM	100	0.004914	N/A	1	0.0218	N/A	114	N/A	11.4	N/A
Zinc	55.42	0.000256	0.01418752	0.298059	0.0045	0.001341265	40	100	0.004914	0.19656	1	0.0218	9.728843335	223.5	0.04	10.5	0.93

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PP 24. Hazard Quotient Calculations for a Carnivorous Bird (American Kestrel)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.00038			0.014				100	0.00792		1	0.117					
Arsenic	11.7	0.00038	0.004446	0.004353	0.014	0.000060935	0.071	0.8307	100	0.00792	0.00657914	1	0.117	0.094752812	22.8	0.00	5.7	0.02
Cadmium	0.303	0.00038	0.00011514	0.002929	0.014	4.10118E-05	69.561	21.076983	100	0.00792	0.16692971	1	0.117	1.428084249	3.4	0.42	0.85	**1.68**
Chromium	10.44	0.00038	0.0039672	0.001988	0.014	0.000027825	0.8	8.352	100	0.00792	0.06614784	1	0.117	0.599511667	5	0.12	1	0.60
Cobalt	6.38	0.00038	0.0024244	0.0044	0.014	0.0000616	0.18	1.1484	100	0.00792	0.00909533	1	0.117	0.098985709	43.9	0.00	23.1	0.00
Copper	21.14	0.00038	0.0080332	0.047162	0.014	0.000660273	1.398	29.55372	100	0.00792	0.23406546	1	0.117	2.074862695	33.2	0.06	26.9	0.08
Lead	14.22	0.00038	0.0054036	0.000534	0.014	7.48125E-06	2.659	37.81098	100	0.00792	0.29946296	1	0.117	2.60576105	15	0.17	1.5	**1.74**
Manganese	748.8	0.00038	0.284544	8.719	0.014	0.122066	0.079	59.1552	100	0.00792	0.46850918	1	0.117	7.479651145	9770	0.00	977	0.01
Molybdenum	2.654	0.00038	0.00100852	NM	0.014	N/A	1	2.654	100	0.00792	0.02101968	1	0.117	0.188275214	35.5	0.01	3.55	0.05
Nickel	8.92	0.00038	0.0033896	0.242769	0.014	0.003398763	1.143	10.19556	100	0.00792	0.08074884	1	0.117	0.748181177	79	0.01	57.2	0.01
Selenium	0.085	0.00038	0.0000323	0.001	0.014	0.000014	1.754	0.14909	100	0.00792	0.00118079	1	0.117	0.010487973	0.8	0.01	0.4	0.03
Thallium	0.24	0.00038	0.0000912	0.0003	0.014	0.0000042	0.123	0.02952	100	0.00792	0.0002338	1	0.117	0.002813662	1.2	0.00	0.12	0.02
Uranium	93.675	0.00038	0.0355965	0.1	0.014	0.0014	1	93.675	100	0.00792	0.741906	1	0.117	6.657286325	1600	0.00	160	0.04
Vanadium	23.26	0.00038	0.0088388	0.00025	0.014	0.0000035	0.019	0.44194	100	0.00792	0.00350016	1	0.117	0.105491152	114	0.00	11.4	0.01
Zinc	55.42	0.00038	0.0210596	0.298059	0.014	0.004172824	16.364	906.89288	100	0.00792	7.18259161	1	0.117	61.60533362	223.5	0.28	10.5	**5.87**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PO 24. Hazard Quotient Calculations for a Carnivorous Bird (Great Horned Owl)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00151			0.075				100	0.03129		1	1.436					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00151	0.017667	0.004353	0.075	0.000326438	0.071	0.8307	100	0.03129	0.0259926	1	1.436	0.030630947	22.8	0.00	5.7	0.01
Cadmium	0.303	0.00151	0.00045753	0.002929	0.075	0.000219706	69.561	21.076983	100	0.03129	0.6594988	1	1.436	0.459732614	3.4	0.14	0.85	0.54
Chromium	10.44	0.00151	0.0157644	0.001988	0.075	0.000149063	0.8	8.352	100	0.03129	0.26133408	1	1.436	0.193069319	5	0.04	1	0.19
Cobalt	6.38	0.00151	0.0096338	0.0044	0.075	0.00033	0.18	1.1484	100	0.03129	0.03593344	1	1.436	0.031961864	43.9	0.00	23.1	0.00
Copper	21.14	0.00151	0.0319214	0.047162	0.075	0.003537176	1.398	29.55372	100	0.03129	0.9247359	1	1.436	0.668659105	33.2	0.02	26.9	0.02
Lead	14.22	0.00151	0.0214722	0.000534	0.075	4.00781E-05	2.659	37.81098	100	0.03129	1.18310556	1	1.436	0.838870364	15	0.06	1.5	0.56
Manganese	748.8	0.00151	1.130688	8.719	0.075	0.653925	0.079	59.1552	100	0.03129	1.85096621	1	1.436	2.531740396	9770	0.00	977	0.00
Molybdenum	2.654	0.00151	0.00400754	NM	0.075	N/A	1	2.654	100	0.03129	0.08304366	1	1.436	0.060620613	35.5	0.00	3.55	0.02
Nickel	8.92	0.00151	0.0134692	0.242769	0.075	0.018207656	1.143	10.19556	100	0.03129	0.31901907	1	1.436	0.244217221	79	0.00	57.2	0.00
Selenium	0.085	0.00151	0.00012835	0.001	0.075	0.000075	1.754	0.14909	100	0.03129	0.00466503	1	1.436	0.003390234	0.8	0.00	0.4	0.01
Thallium	0.24	0.00151	0.0003624	0.0003	0.075	0.0000225	0.123	0.02952	100	0.03129	0.00092368	1	1.436	0.000911268	1.2	0.00	0.12	0.01
Uranium	93.675	0.00151	0.14144925	0.1	0.075	0.0075	1	93.675	100	0.03129	2.93109075	1	1.436	2.144874652	1600	0.00	160	0.01
Vanadium	23.26	0.00151	0.0351226	0.00025	0.075	0.00001875	0.019	0.44194	100	0.03129	0.0138283	1	1.436	0.034101429	114	0.00	11.4	0.00
Zinc	55.42	0.00151	0.0836842	0.298059	0.075	0.022354412	16.364	906.89288	100	0.03129	28.3766782	1	1.436	19.83476102	223.5	0.09	10.5	**1.89**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PS 24. Hazard Quotient Calculations for a Herbivorous Bird (Spruce Grouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00213			0.038			100	0.02077		1	0.515					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00213	0.024921	0.004353	0.038	0.000165395	4	100	0.02077	0.08308	1	0.515	0.210031835	22.8	0.01	5.7	0.04
Cadmium	0.303	0.00213	0.00064539	0.002929	0.038	0.000111318	2.1	100	0.02077	0.043617	1	0.515	0.086162539	3.4	0.03	0.85	0.10
Chromium	10.44	0.00213	0.0222372	0.001988	0.038	0.000075525	0.7	100	0.02077	0.014539	1	0.515	0.071556748	5	0.01	1	0.07
Cobalt	6.38	0.00213	0.0135894	0.0044	0.038	0.0001672	0.3	100	0.02077	0.006231	1	0.515	0.038810874	43.9	0.00	23.1	0.00
Copper	21.14	0.00213	0.0450282	0.047162	0.038	0.001792169	5	100	0.02077	0.10385	1	0.515	0.292563824	33.2	0.01	26.9	0.01
Lead	14.22	0.00213	0.0302886	0.000534	0.038	2.03063E-05	0.5	100	0.02077	0.010385	1	0.515	0.079017294	15	0.01	1.5	0.05
Manganese	748.8	0.00213	1.594944	8.719	0.038	0.331322	610	100	0.02077	12.6697	1	0.515	28.34168155	9770	0.00	977	0.03
Molybdenum	2.654	0.00213	0.00565302	NM	0.038	N/A	NM	100	0.02077	N/A	1	0.515	N/A	35.5	N/A	3.55	N/A
Nickel	8.92	0.00213	0.0189996	0.242769	0.038	0.009225213	5	100	0.02077	0.10385	1	0.515	0.256455947	79	0.00	57.2	0.00
Selenium	0.085	0.00213	0.00018105	0.001	0.038	0.000038	0.05	100	0.02077	0.0010385	1	0.515	0.002441845	0.8	0.00	0.4	0.01
Thallium	0.24	0.00213	0.0005112	0.0003	0.038	0.0000114	0.05	100	0.02077	0.0010385	1	0.515	0.003031262	1.2	0.00	0.12	0.03
Uranium	93.675	0.00213	0.19952775	0.1	0.038	0.0038	4.381676	100	0.02077	0.0910074	1	0.515	0.571524584	1600	0.00	160	0.00
Vanadium	23.26	0.00213	0.0495438	0.00025	0.038	0.0000095	NM	100	0.02077	N/A	1	0.515	N/A	114	N/A	11.4	N/A
Zinc	55.42	0.00213	0.1180446	0.298059	0.038	0.011326235	40	100	0.02077	0.8308	1	0.515	1.864409389	223.5	0.01	10.5	0.18

AOI:	Area of interest
PIA:	Potentially impacted area
COPC:	Contaminant of potential concern
Conc.:	Concentration
mg:	Milligram
kg:	Kilogram
d.w.:	Dry weight
L:	Liter
AUF:	Area use factor
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
NS:	No studies were available for deriving LOAEL or NOAEL
NM:	Not measured
N/A:	Value could not be calculated with the information available

TABLE PM 24. Hazard Quotient Calculations for an Invertivorous Bird (American Robin)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000724			0.0106				100	0.006236		1	0.0771					
Arsenic	11.7	0.000724	0.0084708	0.004353	0.0106	4.61365E-05	0.925	10.8225	100	0.006236	0.0674891	1	0.0771	0.985811239	22.8	0.04	5.7	0.17
Cadmium	0.303	0.000724	0.000219372	0.002929	0.0106	3.10518E-05	190	57.57	100	0.006236	0.3590065	1	0.0771	4.659623136	3.4	**1.37**	0.85	**5.48**
Chromium	10.44	0.000724	0.00755856	0.001988	0.0106	2.10675E-05	11.416	119.18304	100	0.006236	0.7432254	1	0.0771	9.738068287	5	**1.95**	1	**9.74**
Cobalt	6.38	0.000724	0.00461912	0.0044	0.0106	0.00004664	0.321	2.04798	100	0.006236	0.0127712	1	0.0771	0.226160354	43.9	0.01	23.1	0.01
Copper	21.14	0.000724	0.01530536	0.047162	0.0106	0.000499921	5.492	116.10088	100	0.006236	0.7240051	1	0.0771	9.595465222	33.2	0.29	26.9	0.36
Lead	14.22	0.000724	0.01029528	0.000534	0.0106	5.66438E-06	228.261	3245.87142	100	0.006236	20.241254	1	0.0771	262.6660846	15	**17.51**	1.5	**175.11**
Manganese	748.8	0.000724	0.5421312	8.719	0.0106	0.0924214	0.228	170.7264	100	0.006236	1.0646498	1	0.0771	22.03894203	9770	0.00	977	0.02
Molybdenum	2.654	0.000724	0.001921496	NM	0.0106	N/A	2.091	5.549514	100	0.006236	0.0346068	1	0.0771	0.47377776	35.5	0.01	3.55	0.13
Nickel	8.92	0.000724	0.00645808	0.242769	0.0106	0.002573349	7.802	69.59384	100	0.006236	0.4339872	1	0.0771	5.746026135	79	0.07	57.2	0.10
Selenium	0.085	0.000724	0.00006154	0.001	0.0106	0.0000106	13.733	1.167305	100	0.006236	0.0072793	1	0.0771	0.095349598	0.8	0.12	0.4	0.24
Thallium	0.24	0.000724	0.00017376	0.0003	0.0106	0.00000318	1	0.24	100	0.006236	0.0014966	1	0.0771	0.021706615	1.2	0.02	0.12	0.18
Uranium	93.675	0.000724	0.0678207	0.1	0.0106	0.00106	0.063	5.901525	100	0.006236	0.0368019	1	0.0771	1.37072127	1600	0.00	160	0.01
Vanadium	23.26	0.000724	0.01684024	0.00025	0.0106	0.00000265	0.088	2.04688	100	0.006236	0.0127643	1	0.0771	0.384010813	114	0.00	11.4	0.03
Zinc	55.42	0.000724	0.04012408	0.298059	0.0106	0.003159424	49.51	2743.8442	100	0.006236	17.110612	1	0.0771	222.4889226	223.5	1.00	10.5	**21.19**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NS: No studies were available for deriving LOAEL or NOAEL
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 30. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Terrestrial Root Tissue, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
Arsenic	11.7	0.000111	0.0012987	0.004353	0.0061	2.65503E-05	19	100	0.004929	0.093651	1	0.0394	2.410564727	9.63	0.25	1.91	**1.26**
Cadmium	0.303	0.000111	0.000033633	0.002929	0.0061	1.78694E-05	4	100	0.004929	0.019716	1	0.0394	0.501713259	2.3	0.22	0.23	**2.18**
Chromium	10.44	0.000111	0.00115884	0.001988	0.0061	1.21238E-05	16	100	0.004929	0.078864	1	0.0394	2.031344258	56.8	0.04	5.68	0.36
Cobalt	6.38	0.000111	0.00070818	0.0044	0.0061	0.00002684	15	100	0.004929	0.073935	1	0.0394	1.895178173	20	0.09	5	0.38
Copper	21.14	0.000111	0.00234654	0.047162	0.0061	0.00028769	116	100	0.004929	0.571764	1	0.0394	14.57863529	35.4	0.41	24.3	0.60
Lead	14.22	0.000111	0.00157842	0.000534	0.0061	3.25969E-06	37.9	100	0.004929	0.1868091	1	0.0394	4.78149187	80	0.06	8	0.60
Manganese	748.8	0.000111	0.0831168	8.719	0.0061	0.0531859	1420	100	0.004929	6.99918	1	0.0394	181.1036218	268	0.68	83	**2.18**
Molybdenum	2.654	0.000111	0.000294594	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	8.92	0.000111	0.00099012	0.242769	0.0061	0.001480889	26	100	0.004929	0.128154	1	0.0394	3.315355568	42.1	0.08	23.1	0.14
Selenium	0.085	0.000111	0.000009435	0.001	0.0061	0.0000061	0.5	100	0.004929	0.0024645	1	0.0394	0.062945051	0.25	0.25	0.025	**2.52**
Thallium	0.24	0.000111	0.00002664	0.0003	0.0061	0.00000183	0.4	100	0.004929	0.0019716	1	0.0394	0.050763198	0.74	0.07	0.074	0.69
Uranium	93.675	0.000111	0.010397925	0.1	0.0061	0.00061	876.08901	100	0.004929	4.3182427	1	0.0394	109.8794583	5	**21.98**	0.5	**219.76**
Vanadium	23.26	0.000111	0.00258186	0.00025	0.0061	0.000001525	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	55.42	0.000111	0.00615162	0.298059	0.0061	0.001818159	147	100	0.004929	0.724563	1	0.0394	18.59220251	225	0.08	22.5	0.83

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PA 36. Hazard Quotient Calculations for a Herbivorous Mammal (Meadow Vole)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000111			0.0061			100	0.004929		1	0.0394					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000111	0.0012987	0.004353	0.0061	2.65503E-05	4	100	0.004929	0.019716	1	0.0394	0.534041885	9.63	0.06	1.91	0.28
Cadmium	0.303	0.000111	0.000033633	0.002929	0.0061	1.78694E-05	2.1	100	0.004929	0.0103509	1	0.0394	0.264020366	2.3	0.11	0.23	**1.15**
Chromium	10.44	0.000111	0.00115884	0.001988	0.0061	1.21238E-05	0.7	100	0.004929	0.0034503	1	0.0394	0.117290958	56.8	0.00	5.68	0.02
Cobalt	6.38	0.000111	0.00070818	0.0044	0.0061	0.00002684	0.3	100	0.004929	0.0014787	1	0.0394	0.056185787	20	0.00	5	0.01
Copper	21.14	0.000111	0.00234654	0.047162	0.0061	0.00028769	5	100	0.004929	0.024645	1	0.0394	0.692366253	35.4	0.02	24.3	0.03
Lead	14.22	0.000111	0.00157842	0.000534	0.0061	3.25969E-06	0.5	100	0.004929	0.0024645	1	0.0394	0.102694916	80	0.00	8	0.01
Manganese	748.8	0.000111	0.0831168	8.719	0.0061	0.0531859	610	100	0.004929	3.00669	1	0.0394	79.77138832	268	0.30	83	0.96
Molybdenum	2.654	0.000111	0.000294594	NM	0.0061	N/A	NM	100	0.004929	N/A	1	0.0394	N/A	1.9	N/A	0.19	N/A
Nickel	8.92	0.000111	0.00099012	0.242769	0.0061	0.001480889	5	100	0.004929	0.024645	1	0.0394	0.688223588	42.1	0.02	23.1	0.03
Selenium	0.085	0.000111	0.000009435	0.001	0.0061	0.0000061	0.05	100	0.004929	0.0002465	1	0.0394	0.006649365	0.25	0.03	0.025	0.27
Thallium	0.24	0.000111	0.00002664	0.0003	0.0061	0.00000183	0.05	100	0.004929	0.0002465	1	0.0394	0.006977665	0.74	0.01	0.074	0.09
Uranium	93.675	0.000111	0.010397925	0.1	0.0061	0.00061	4.381676	100	0.004929	0.0215973	1	0.0394	0.8275433	5	0.17	0.5	**1.66**
Vanadium	23.26	0.000111	0.00258186	0.00025	0.0061	0.000001525	NM	100	0.004929	N/A	1	0.0394	N/A	2.1	N/A	0.21	N/A
Zinc	55.42	0.000111	0.00615162	0.298059	0.0061	0.001818159	40	100	0.004929	0.19716	1	0.0394	5.206339564	225	0.02	22.5	0.23

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PB 24. Hazard Quotient Calculations for a Herbivorous Mammal (White-tailed Deer)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Above Ground Terrestrial Vegetation, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.083			3.61			100	1.517		1	68.6					
Arsenic	11.7	0.083	0.9711	0.004353	3.61	0.015712525	4	100	1.517	6.068	1	68.6	0.102839833	9.63	0.01	1.91	0.05
Cadmium	0.303	0.083	0.025149	0.002929	3.61	0.010575176	2.1	100	1.517	3.1857	1	68.6	0.046959536	2.3	0.02	0.23	0.20
Chromium	10.44	0.083	0.86652	0.001988	3.61	0.007174875	0.7	100	1.517	1.0619	1	68.6	0.028215669	56.8	0.00	5.68	0.00
Cobalt	6.38	0.083	0.52954	0.0044	3.61	0.015884	0.3	100	1.517	0.4551	1	68.6	0.014584898	20	0.00	5	0.00
Copper	21.14	0.083	1.75462	0.047162	3.61	0.170256094	5	100	1.517	7.585	1	68.6	0.138627931	35.4	0.00	24.3	0.01
Lead	14.22	0.083	1.18026	0.000534	3.61	0.001929094	0.5	100	1.517	0.7585	1	68.6	0.028289928	80	0.00	8	0.00
Manganese	748.8	0.083	62.1504	8.719	3.61	31.47559	610	100	1.517	925.37	1	68.6	14.85416895	268	0.06	83	0.18
Molybdenum	2.654	0.083	0.220282	NM	3.61	N/A	NM	100	1.517	N/A	1	68.6	N/A	1.9	N/A	0.19	N/A
Nickel	8.92	0.083	0.74036	0.242769	3.61	0.876395188	5	100	1.517	7.585	1	68.6	0.134136373	42.1	0.00	23.1	0.01
Selenium	0.085	0.083	0.007055	0.001	3.61	0.00361	0.05	100	1.517	0.07585	1	68.6	0.001261152	0.25	0.01	0.025	0.05
Thallium	0.24	0.083	0.01992	0.0003	3.61	0.001083	0.05	100	1.517	0.07585	1	68.6	0.001411851	0.74	0.00	0.074	0.02
Uranium	93.675	0.083	7.775025	0.1	3.61	0.361	4.381676	100	1.517	6.6470025	1	68.6	0.215496028	5	0.04	0.5	0.43
Vanadium	23.26	0.083	1.93058	0.00025	3.61	0.0009025	NM	100	1.517	N/A	1	68.6	N/A	2.1	N/A	0.21	N/A
Zinc	55.42	0.083	4.59986	0.298059	3.61	1.075992353	40	100	1.517	60.68	1	68.6	0.967286477	225	0.00	22.5	0.04

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PD 24. Hazard Quotient Calculations for a Carnivorous Mammal (Coyote)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.0072			1.02				100	0.2498		1	13.3					
Arsenic	11.7	0.0072	0.08424	0.004353	1.02	0.00443955	0.071	0.8307	100	0.2498	0.20750886	1	13.3	0.022269805	9.63	0.00	1.91	0.01
Cadmium	0.303	0.0072	0.0021816	0.002929	1.02	0.002988	69.561	21.076983	100	0.2498	5.26503035	1	13.3	0.396255636	2.3	0.17	0.23	**1.72**
Chromium	10.44	0.0072	0.075168	0.001988	1.02	0.00202725	0.8	8.352	100	0.2498	2.0863296	1	13.3	0.162671041	56.8	0.00	5.68	0.03
Cobalt	6.38	0.0072	0.045936	0.0044	1.02	0.004488	0.18	1.1484	100	0.2498	0.28687032	1	13.3	0.025360475	20	0.00	5	0.01
Copper	21.14	0.0072	0.152208	0.047162	1.02	0.0481056	1.398	29.55372	100	0.2498	7.38251926	1	13.3	0.570137809	35.4	0.02	24.3	0.02
Lead	14.22	0.0072	0.102384	0.000534	1.02	0.000545063	2.659	37.81098	100	0.2498	9.4451828	1	13.3	0.717903148	80	0.01	8	0.09
Manganese	748.8	0.0072	5.39136	8.719	1.02	8.89338	0.079	59.1552	100	0.2498	14.776969	1	13.3	2.185090899	268	0.01	83	0.03
Molybdenum	2.654	0.0072	0.0191088	NM	1.02	N/A	1	2.654	100	0.2498	0.6629692	1	13.3	0.05128406	1.9	0.03	0.19	0.27
Nickel	8.92	0.0072	0.064224	0.242769	1.02	0.247624125	1.143	10.19556	100	0.2498	2.54685089	1	13.3	0.214939775	42.1	0.01	23.1	0.01
Selenium	0.085	0.0072	0.000612	0.001	1.02	0.00102	1.754	0.14909	100	0.2498	0.03724268	1	13.3	0.002922908	0.25	0.01	0.025	0.12
Thallium	0.24	0.0072	0.001728	0.0003	1.02	0.000306	0.123	0.02952	100	0.2498	0.0073741	1	13.3	0.000707376	0.74	0.00	0.074	0.01
Uranium	93.675	0.0072	0.67446	0.1	1.02	0.102	1	93.675	100	0.2498	23.400015	1	13.3	1.817780075	5	0.36	0.5	**3.64**
Vanadium	23.26	0.0072	0.167472	0.00025	1.02	0.000255	0.019	0.44194	100	0.2498	0.11039661	1	13.3	0.02091155	2.1	0.01	0.21	0.10
Zinc	55.42	0.0072	0.399024	0.298059	1.02	0.30402	16.364	906.89288	100	0.2498	226.541841	1	13.3	17.08608161	225	0.08	22.5	0.76

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PE 24. Hazard Quotient Calculations for a Carnivorous Mammal (Bobcat)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Small Mammals)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.00529			0.73				100	0.18371		1	9.2					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to small mammal BAF	Conc. in Mammals (mg/kg d.w.)	Percent of Diet Mammals	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.00529	0.061893	0.004353	0.73	0.003177325	0.071	0.8307	100	0.18371	0.1526079	1	9.2	0.023660676	9.63	0.00	1.91	0.01
Cadmium	0.303	0.00529	0.00160287	0.002929	0.73	0.002138471	69.561	21.076983	100	0.18371	3.87205255	1	9.2	0.421281944	2.3	0.18	0.23	**1.83**
Chromium	10.44	0.00529	0.0552276	0.001988	0.73	0.001450875	0.8	8.352	100	0.18371	1.53434592	1	9.2	0.172937434	56.8	0.00	5.68	0.03
Cobalt	6.38	0.00529	0.0337502	0.0044	0.73	0.003212	0.18	1.1484	100	0.18371	0.21097256	1	9.2	0.026949431	20	0.00	5	0.01
Copper	21.14	0.00529	0.1118306	0.047162	0.73	0.034428518	1.398	29.55372	100	0.18371	5.4293139	1	9.2	0.606040546	35.4	0.02	24.3	0.02
Lead	14.22	0.00529	0.0752238	0.000534	0.73	0.000390094	2.659	37.81098	100	0.18371	6.94625514	1	9.2	0.763246634	80	0.01	8	0.10
Manganese	748.8	0.00529	3.961152	8.719	0.73	6.36487	0.079	59.1552	100	0.18371	10.8674018	1	9.2	2.303633021	268	0.01	83	0.03
Molybdenum	2.654	0.00529	0.01403966	NM	0.73	N/A	1	2.654	100	0.18371	0.48756634	1	9.2	0.054522391	1.9	0.03	0.19	0.29
Nickel	8.92	0.00529	0.0471868	0.242769	0.73	0.177221188	1.143	10.19556	100	0.18371	1.87302633	1	9.2	0.227981991	42.1	0.01	23.1	0.01
Selenium	0.085	0.00529	0.00044965	0.001	0.73	0.00073	1.754	0.14909	100	0.18371	0.02738932	1	9.2	0.003105323	0.25	0.01	0.025	0.12
Thallium	0.24	0.00529	0.0012696	0.0003	0.73	0.000219	0.123	0.02952	100	0.18371	0.00542312	1	9.2	0.000751274	0.74	0.00	0.074	0.01
Uranium	93.675	0.00529	0.49554075	0.1	0.73	0.073	1	93.675	100	0.18371	17.2090343	1	9.2	1.932345109	5	0.39	0.5	**3.86**
Vanadium	23.26	0.00529	0.1230454	0.00025	0.73	0.0001825	0.019	0.44194	100	0.18371	0.0811888	1	9.2	0.022219206	2.1	0.01	0.21	0.11
Zinc	55.42	0.00529	0.2931718	0.298059	0.73	0.217582941	16.364	906.89288	100	0.18371	166.605291	1	9.2	18.16478758	225	0.08	22.5	0.81

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PI 24. Hazard Quotient Calculations for an Invertivorous Mammal (Masked Shrew)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, One Dietary Item (Earthworms)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day d.w.)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Soil to earthworm BAF	Conc. in earthworms (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day d.w.)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
INITIAL SETTINGS		0.000155			0.00231				100	0.002835		1	0.00428					
Arsenic	11.7	0.000155	0.0018135	0.004353	0.00231	1.00543E-05	0.925	10.8225	100	0.002835	0.0306818	1	0.00428	7.594706022	9.63	0.79	1.91	**3.98**
Cadmium	0.303	0.000155	0.000046965	0.002929	0.00231	6.76694E-06	190	57.57	100	0.002835	0.163211	1	0.00428	38.14595372	2.3	**16.59**	0.23	**165.85**
Chromium	10.44	0.000155	0.0016182	0.001988	0.00231	4.59113E-06	11.416	119.18304	100	0.002835	0.3378839	1	0.00428	79.32399755	56.8	**1.40**	5.68	**13.97**
Cobalt	6.38	0.000155	0.0009889	0.0044	0.00231	0.000010164	0.321	2.04798	100	0.002835	0.005806	1	0.00428	1.589973668	20	0.08	5	0.32
Copper	21.14	0.000155	0.0032767	0.047162	0.00231	0.000108945	5.492	116.10088	100	0.002835	0.329146	1	0.00428	77.69430837	35.4	**2.19**	24.3	**3.20**
Lead	14.22	0.000155	0.0022041	0.000534	0.00231	1.23441E-06	228.261	3245.87142	100	0.002835	9.2020455	1	0.00428	2150.52589	80	**26.88**	8	**268.82**
Manganese	748.8	0.000155	0.116064	8.719	0.00231	0.02014089	0.228	170.7264	100	0.002835	0.4840093	1	0.00428	144.9098678	268	0.54	83	**1.75**
Molybdenum	2.654	0.000155	0.00041137	NM	0.00231	N/A	2.091	5.549514	100	0.002835	0.0157329	1	0.00428	3.772019203	1.9	**1.99**	0.19	**19.85**
Nickel	8.92	0.000155	0.0013826	0.242769	0.00231	0.000560796	7.802	69.59384	100	0.002835	0.1972985	1	0.00428	46.55185332	42.1	**1.11**	23.1	**2.02**
Selenium	0.085	0.000155	0.000013175	0.001	0.00231	0.00000231	13.733	1.167305	100	0.002835	0.0033093	1	0.00428	0.776821186	0.25	**3.11**	0.025	**31.07**
Thallium	0.24	0.000155	0.0000372	0.0003	0.00231	0.000000693	1	0.24	100	0.002835	0.0006804	1	0.00428	0.167825467	0.74	0.23	0.074	**2.27**
Uranium	93.675	0.000155	0.014519625	0.1	0.00231	0.000231	0.063	5.901525	100	0.002835	0.0167308	1	0.00428	7.355478592	5	**1.47**	0.5	**14.71**
Vanadium	23.26	0.000155	0.0036053	0.00025	0.00231	5.775E-07	0.088	2.04688	100	0.002835	0.0058029	1	0.00428	2.198313621	2.1	**1.05**	0.21	**10.47**
Zinc	55.42	0.000155	0.0085901	0.298059	0.00231	0.000688516	49.51	2743.8442	100	0.002835	7.7787983	1	0.00428	1819.644141	225	**8.09**	22.5	**80.87**

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
BAF: Bioaccumulation factor
NM: Not measured
N/A: Value could not be calculated with the information available

TABLE PF 24. Hazard Quotient Calculations for an Onmivorous Mammal (Deer Mouse)
Model 4: Representative Life History Parameters, Central Tendency Metal Concentrations, Two Food Items (Above Ground Terrestrial Vegetation and Terrestrial Invertebrates, Maximum Concentrations)
AOI: West Haul Road; Water Concentrations from Western Drainage
Midnite Mine Site
Wellpinit, WA

INITIAL SETTINGS		0.000317			0.00229			58		42	0.003183		1	0.0185					
COPC	Conc. in Soil (mg/kg d.w.)	Soil Ingestion Rate (kg/day)	Total Intake through Soil (mg/day)	Conc. in Water (mg/L)	Water Ingestion Rate (L/day)	Total Intake through Water (mg/day)	Conc. in Plants (mg/kg d.w.)	Percent of Diet Plants	Conc. in Inverts. (mg/kg d.w)	Percent of Diet Inverts.	Food Ingestion Rate (kg/day)	Total Food Conc. (mg/day)	AUF	Body Weight (kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	HQ LOAEL	NOAEL (mg/kg/day)	HQ NOAEL
Arsenic	11.7	0.000317	0.0037089	0.004353	0.00229	9.96723E-06	4	58	2.1	42	0.003183	0.01019197	1	0.0185	0.751936931	9.63	0.08	1.91	0.39
Cadmium	0.303	0.000317	0.000096051	0.002929	0.00229	6.70835E-06	2.1	58	1.3	42	0.003183	0.00561481	1	0.0185	0.309057911	2.3	0.13	0.23	**1.34**
Chromium	10.44	0.000317	0.00330948	0.001988	0.00229	4.55138E-06	0.7	58	2.2	42	0.003183	0.00423339	1	0.0185	0.407968723	56.8	0.01	5.68	0.07
Cobalt	6.38	0.000317	0.00202246	0.0044	0.00229	0.000010076	0.3	58	1.26	42	0.003183	0.00223829	1	0.0185	0.230855222	20	0.01	5	0.05
Copper	21.14	0.000317	0.00670138	0.047162	0.00229	0.000108002	5	58	69.1	42	0.003183	0.10160773	1	0.0185	5.860384205	35.4	0.17	24.3	0.24
Lead	14.22	0.000317	0.00450774	0.000534	0.00229	1.22372E-06	0.5	58	3.5	42	0.003183	0.00560208	1	0.0185	0.546542904	80	0.01	8	0.07
Manganese	748.8	0.000317	0.2373696	8.719	0.00229	0.01996651	610	58	108	42	0.003183	1.27052628	1	0.0185	82.58715622	268	0.31	83	1.00
Molybdenum	2.654	0.000317	0.000841318	NM	0.00229	N/A	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	1.9	N/A	0.19	N/A
Nickel	8.92	0.000317	0.00282764	0.242769	0.00229	0.00055594	5	58	2	42	0.003183	0.01190442	1	0.0185	0.826378402	42.1	0.02	23.1	0.04
Selenium	0.085	0.000317	0.000026945	0.001	0.00229	0.00000229	0.05	58	0.3	42	0.003183	0.00049337	1	0.0185	0.028248649	0.25	0.11	0.025	**1.13**
Thallium	0.24	0.000317	0.00007608	0.0003	0.00229	0.000000687	0.05	58	0.1	42	0.003183	0.00022599	1	0.0185	0.016365405	0.74	0.02	0.074	0.22
Uranium	93.675	0.000317	0.029694975	0.1	0.00229	0.000229	4.381676	58	7.52	42	0.003183	0.01814237	1	0.0185	2.598181056	5	0.52	0.5	**5.20**
Vanadium	23.26	0.000317	0.00737342	0.00025	0.00229	5.725E-07	NM	58	NM	42	0.003183	N/A	1	0.0185	N/A	2.1	N/A	0.21	N/A
Zinc	55.42	0.000317	0.01756814	0.298059	0.00229	0.000682555	40	58	152	42	0.003183	0.27704832	1	0.0185	15.9621089	225	0.07	22.5	0.71

AOI: Area of interest
PIA: Potentially impacted area
COPC: Contaminant of potential concern
Conc.: Concentration
mg: Milligram
kg: Kilogram
d.w.: Dry weight
L: Liter
AUF: Area use factor
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
inverts: Invertebrates
NM: Not measured
N/A: Value could not be calculated with the information available

Appendix Q - Summary Tables of Hazard Quotients for Each Receptor Species
Midnite Mine Site
Wellpinit, Washington

Table QR. Summary of Hazard Quotient Calculations

Receptor: Bald Eagle (Piscivorous Bird)

Instream Sediments

Midnite Mine Site

Wellpinit, WA

a). Mined Area

	Pit 3							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.22	0.88	0.10	0.41
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.28	0.38	0.13	0.18
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.11	1.11	0.06	0.61
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

	Pit 4							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.08	0.10	0.01	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.02	0.15	0.01	0.09
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Pollution Control Pond							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.01			0.22	0.89	0.11	0.42
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.01	0.01			N/A	N/A	N/A	N/A
Manganes	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.01			0.32	0.44	0.15	0.21
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.02			0.14	1.39	0.06	0.62
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.05			N/A	N/A	N/A	N/A

	Blood Pool							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.03	0.11	0.01	0.06
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.14	0.20	0.07	0.09
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.04	0.38	0.02	0.18
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

	Outfall							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.01
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

b) PIA: Western, Central, and Eastern Drainages

	Western Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.06	0.01	0.03
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.05	0.06	0.02	0.03
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Central Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.17	0.67	0.09	0.38
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.16	0.22	0.09	0.13
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.00	0.04	0.00	0.01
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

	Upper Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.06	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.04	0.05	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.04	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.01	0.02	0.00	0.01
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

c). PIA: Blue Creek

	Upper Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.02	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.03	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.02			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.01	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

	Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.02	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	FDR Lake							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.01	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganes	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

PIA: Potentially impacted area

LOAEL: Lowest observable adverse effect level

HQ: Hazard quotient

NOAEL: No observable adverse effect level

N/A: Value could not be calculated with the information available

HQ < 1.0

HQ ≥ 1.0

Table QE. Summary of Hazard Quotient Calculations
Receptor: Bobcat (Carnivorous Mammal)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.29	0.00	0.01	0.20	0.99	0.00	0.02	0.06	0.29	0.00	0.01	0.20	0.99	0.00	0.02
Cadmium	0.01	0.06	0.00	0.02	**8.40**	**84.0**	0.16	**1.59**	0.01	0.06	0.00	0.02	**8.40**	**84.0**	0.16	**1.59**
Chromium	0.00	0.03	0.00	0.00	0.08	0.76	0.00	0.05	0.00	0.03	0.00	0.00	0.08	0.76	0.00	0.05
Cobalt	0.01	0.03	0.00	0.02	0.02	0.08	0.01	0.03	0.01	0.03	0.01	0.02	0.02	0.09	0.01	0.03
Copper	0.01	0.01	0.00	0.00	0.27	0.39	0.02	0.03	0.01	0.01	0.00	0.00	0.27	0.39	0.02	0.03
Lead	0.00	0.02	0.00	0.00	0.22	**2.24**	0.01	0.11	0.00	0.02	0.00	0.00	0.22	**2.24**	0.01	0.11
Manganese	0.08	0.27	0.03	0.09	0.20	0.66	0.03	0.11	0.09	0.29	0.03	0.09	0.21	0.68	0.03	0.11
Molybdenum	0.04	0.38	0.00	0.03	**1.37**	**13.7**	0.11	**1.09**	0.04	0.38	0.00	0.03	**1.37**	**13.7**	0.11	**1.09**
Nickel	0.01	0.01	0.00	0.01	0.10	0.19	0.01	0.02	0.01	0.01	0.00	0.01	0.10	0.19	0.01	0.02
Selenium	0.84	**8.45**	0.01	0.14	**50.9**	**509**	0.57	**5.74**	0.85	**8.47**	0.01	0.12	**50.9**	**509**	0.57	**5.72**
Thallium	0.01	0.08	0.00	0.00	0.04	0.41	0.00	0.02	0.01	0.08	0.00	0.00	0.04	0.41	0.00	0.02
Uranium	0.64	**6.36**	0.29	**2.88**	**8.28**	**82.8**	0.61	**6.13**	0.74	**7.40**	0.29	**2.95**	**8.38**	**83.8**	0.62	**6.20**
Vanadium	0.14	**1.44**	0.01	0.08	0.24	**2.38**	0.01	0.13	0.14	**1.44**	0.01	0.08	0.24	**2.38**	0.01	0.13
Zinc	0.01	0.06	0.00	0.01	**2.20**	**22.0**	0.08	0.77	0.01	0.06	0.00	0.01	**2.20**	**22.0**	0.08	0.77

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.06	0.00	0.00	0.04	0.21	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Cadmium	0.00	0.01	0.00	0.00	**1.92**	**19.2**	0.21	**2.05**	0.00	0.02	0.00	0.01	0.87	**8.66**	0.12	**1.16**
Chromium	0.00	0.01	0.00	0.00	0.03	0.34	0.00	0.05	0.00	0.01	0.00	0.00	0.02	0.16	0.00	0.03
Cobalt	0.00	0.01	0.00	0.00	0.01	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.10	0.15	0.01	0.02	0.00	0.00	0.00	0.00	0.05	0.07	0.01	0.01
Lead	0.00	0.01	0.00	0.00	0.07	0.72	0.01	0.10	0.00	0.00	0.00	0.00	0.04	0.43	0.01	0.09
Manganese	0.02	0.07	0.00	0.01	0.07	0.22	0.01	0.02	0.03	0.11	0.02	0.07	0.05	0.16	0.03	0.08
Molybdenum	0.00	0.02	0.00	0.00	0.07	0.69	0.01	0.08	0.00	0.02	0.00	0.00	0.08	0.77	0.01	0.09
Nickel	0.00	0.00	0.00	0.00	0.05	0.09	0.01	0.01	0.00	0.01	0.00	0.00	0.03	0.05	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.05	0.48	0.01	0.12	0.01	0.07	0.00	0.01	0.43	**4.30**	0.03	0.27
Thallium	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01
Uranium	0.01	0.09	0.00	0.02	0.25	**2.52**	0.03	0.29	0.02	0.20	0.01	0.07	0.27	**2.65**	0.03	0.31
Vanadium	0.05	0.54	0.01	0.08	0.09	0.90	0.01	0.14	0.03	0.30	0.01	0.06	0.05	0.50	0.01	0.10
Zinc	0.00	0.01	0.00	0.00	0.67	**6.70**	0.07	0.74	0.00	0.02	0.00	0.01	0.34	**3.37**	0.06	0.62

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.11	0.00	0.01	0.08	0.38	0.00	0.02	0.01	0.04	0.00	0.00	0.02	0.12	0.00	0.01
Cadmium	0.00	0.01	0.00	0.00	**2.06**	**20.6**	0.23	**2.30**	0.00	0.01	0.00	0.00	**1.73**	**17.3**	0.18	**1.83**
Chromium	0.00	0.01	0.00	0.00	0.02	0.25	0.00	0.04	0.00	0.01	0.00	0.00	0.02	0.16	0.00	0.03
Cobalt	0.00	0.01	0.00	0.00	0.02	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01
Copper	0.00	0.01	0.00	0.00	0.19	0.27	0.02	0.02	0.00	0.01	0.00	0.00	0.17	0.24	0.02	0.02
Lead	0.00	0.01	0.00	0.00	0.08	0.77	0.01	0.09	0.00	0.00	0.00	0.00	0.04	0.43	0.01	0.10
Manganese	0.02	0.05	0.00	0.01	0.04	0.14	0.01	0.02	0.01	0.05	0.00	0.01	0.04	0.13	0.01	0.03
Molybdenum	0.01	0.06	0.00	0.01	0.21	**2.15**	0.02	0.22	0.01	0.09	0.00	0.01	0.32	**3.18**	0.03	0.29
Nickel	0.00	0.00	0.00	0.00	0.06	0.12	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.05	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.05	0.54	0.01	0.14	0.00	0.01	0.00	0.01	0.05	0.48	0.01	0.12
Thallium	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.08	0.00	0.01
Uranium	0.04	0.43	0.00	0.04	**1.45**	**14.5**	0.13	**1.32**	0.12	**1.21**	0.01	0.12	**4.28**	**42.8**	0.39	**3.86**
Vanadium	0.04	0.45	0.01	0.07	0.07	0.74	0.01	0.12	0.03	0.31	0.01	0.06	0.05	0.51	0.01	0.11
Zinc	0.00	0.01	0.00	0.00	0.52	**5.22**	0.08	0.76	0.00	0.01	0.00	0.00	0.47	**4.68**	0.08	0.81

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table QJ. Summary of Hazard Quotient Calculations
Receptor: Cliff Swallow (Insectivorous Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.03	0.13	0.00	0.00	0.10	0.39	0.06	0.24	0.03	0.13	0.00	0.00	0.10	0.39	0.06	0.24
Cadmium	0.01	0.03	0.00	0.01	0.28	**1.10**	0.25	**1.00**	0.01	0.03	0.00	0.01	0.28	**1.10**	0.25	**1.00**
Chromium	0.04	0.21	0.00	0.01	0.35	**1.75**	0.29	**1.43**	0.04	0.21	0.00	0.01	0.35	**1.75**	0.29	**1.43**
Cobalt	0.01	0.01	0.00	0.01	0.03	0.05	0.02	0.04	0.01	0.02	0.01	0.01	0.03	0.05	0.02	0.05
Copper	0.01	0.01	0.00	0.00	**1.47**	**1.81**	**1.34**	**1.66**	0.01	0.01	0.00	0.00	**1.47**	**1.81**	**1.34**	**1.66**
Lead	0.02	0.18	0.00	0.01	0.18	**1.81**	0.15	**1.51**	0.02	0.18	0.00	0.01	0.18	**1.81**	0.15	**1.51**
Manganese	0.00	0.04	0.00	0.02	0.01	0.12	0.01	0.09	0.00	0.05	0.00	0.02	0.01	0.13	0.01	0.09
Molybdenum	0.00	0.03	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.03	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.01	0.03	0.04	0.02	0.03	0.01	0.01	0.00	0.01	0.03	0.04	0.02	0.03
Selenium	0.36	0.73	0.01	0.01	0.63	**1.25**	0.25	0.50	0.37	0.73	0.01	0.01	0.63	**1.26**	0.25	0.49
Thallium	0.01	0.06	0.00	0.00	0.06	0.65	0.05	0.54	0.01	0.06	0.00	0.00	0.06	0.65	0.05	0.54
Uranium	0.00	0.04	0.00	0.02	0.01	0.08	0.01	0.05	0.01	0.05	0.00	0.02	0.01	0.08	0.01	0.05
Vanadium	0.00	0.04	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.23	0.00	0.07	0.49	**10.4**	0.44	**9.40**	0.01	0.24	0.00	0.08	0.49	**10.4**	0.44	**9.41**

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.03	0.00	0.00	0.07	0.29	0.06	0.24	0.00	0.00	0.00	0.00	0.07	0.26	0.06	0.24
Cadmium	0.00	0.00	0.00	0.00	0.27	**1.07**	0.25	0.99	0.00	0.02	0.00	0.01	0.27	**1.09**	0.25	**1.00**
Chromium	0.02	0.09	0.00	0.01	0.33	**1.63**	0.29	**1.43**	0.01	0.04	0.00	0.01	0.32	**1.58**	0.29	**1.43**
Cobalt	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04
Copper	0.00	0.00	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**	0.00	0.00	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**
Lead	0.01	0.06	0.00	0.01	0.17	**1.69**	0.15	**1.51**	0.00	0.03	0.00	0.01	0.17	**1.67**	0.15	**1.51**
Manganese	0.00	0.01	0.00	0.00	0.01	0.09	0.01	0.07	0.00	0.02	0.00	0.02	0.01	0.10	0.01	0.09
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02	0.00	0.01	0.00	0.00	0.02	0.03	0.02	0.03
Selenium	0.00	0.00	0.00	0.00	0.26	0.53	0.24	0.48	0.00	0.01	0.00	0.00	0.27	0.53	0.24	0.48
Thallium	0.00	0.01	0.00	0.00	0.06	0.59	0.05	0.54	0.00	0.00	0.00	0.00	0.06	0.59	0.05	0.54
Uranium	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Vanadium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.00	0.48	**10.2**	0.44	**9.33**	0.00	0.08	0.00	0.03	0.48	**10.2**	0.44	**9.35**

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.05	0.00	0.00	0.08	0.31	0.06	0.24	0.00	0.02	0.00	0.00	0.07	0.27	0.06	0.24
Cadmium	0.00	0.00	0.00	0.00	0.27	**1.07**	0.25	0.99	0.00	0.00	0.00	0.00	0.27	**1.07**	0.25	0.99
Chromium	0.01	0.07	0.00	0.01	0.32	**1.61**	0.29	**1.43**	0.01	0.05	0.00	0.01	0.32	**1.58**	0.28	**1.42**
Cobalt	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04
Copper	0.01	0.01	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**	0.01	0.01	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**
Lead	0.01	0.06	0.00	0.01	0.17	**1.69**	0.15	**1.51**	0.00	0.03	0.00	0.01	0.17	**1.67**	0.15	**1.51**
Manganese	0.00	0.01	0.00	0.00	0.01	0.08	0.01	0.07	0.00	0.01	0.00	0.00	0.01	0.08	0.01	0.07
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.26	0.53	0.24	0.48	0.00	0.00	0.00	0.00	0.26	0.53	0.24	0.48
Thallium	0.00	0.01	0.00	0.00	0.06	0.59	0.05	0.54	0.00	0.01	0.00	0.00	0.06	0.60	0.05	0.54
Uranium	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.03
Vanadium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.48	**10.2**	0.44	**9.33**	0.00	0.03	0.00	0.01	0.48	**10.2**	0.44	**9.34**

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QD. Summary of Hazard Quotient Calculations
Receptor: Coyote (Carnivorous Mammal)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.22	0.00	0.01	0.15	0.75	0.00	0.02	0.04	0.22	0.00	0.01	0.15	0.75	0.00	0.02
Cadmium	0.01	0.05	0.00	0.02	**6.38**	**63.8**	0.15	**1.49**	0.01	0.05	0.00	0.02	**6.38**	**63.8**	0.15	**1.49**
Chromium	0.00	0.02	0.00	0.00	0.06	0.58	0.00	0.05	0.00	0.02	0.00	0.00	0.06	0.58	0.00	0.05
Cobalt	0.01	0.02	0.00	0.02	0.02	0.07	0.01	0.02	0.01	0.03	0.00	0.02	0.02	0.07	0.01	0.03
Copper	0.00	0.01	0.00	0.00	0.20	0.29	0.02	0.03	0.00	0.01	0.00	0.00	0.20	0.29	0.02	0.03
Lead	0.00	0.02	0.00	0.00	0.17	**1.70**	0.01	0.10	0.00	0.02	0.00	0.00	0.17	**1.70**	0.01	0.10
Manganese	0.07	0.23	0.03	0.09	0.16	0.52	0.03	0.10	0.08	0.25	0.03	0.09	0.17	0.55	0.03	0.10
Molybdenum	0.03	0.29	0.00	0.03	**1.04**	**10.4**	0.10	**1.02**	0.03	0.29	0.00	0.03	**1.04**	**10.41**	0.10	**1.02**
Nickel	0.01	0.01	0.00	0.01	0.08	0.14	0.01	0.02	0.01	0.01	0.00	0.01	0.08	0.14	0.01	0.02
Selenium	0.65	**6.49**	0.01	0.13	**38.7**	**387**	0.54	**5.40**	0.65	**6.51**	0.01	0.11	**38.7**	**387**	0.54	**5.38**
Thallium	0.01	0.06	0.00	0.00	0.03	0.31	0.00	0.02	0.01	0.06	0.00	0.00	0.03	0.31	0.00	0.01
Uranium	0.56	**5.59**	0.28	**2.78**	**6.37**	**63.7**	0.58	**5.84**	0.66	**6.57**	0.28	**2.85**	**6.47**	**64.7**	0.59	**5.90**
Vanadium	0.11	**1.10**	0.01	0.07	0.18	**1.82**	0.01	0.12	0.11	**1.10**	0.01	0.07	0.18	**1.82**	0.01	0.12
Zinc	0.00	0.05	0.00	0.01	**1.67**	**16.7**	0.07	0.72	0.01	0.05	0.00	0.01	**1.67**	**16.7**	0.07	0.72

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.05	0.00	0.00	0.03	0.16	0.00	0.00
Cadmium	0.00	0.01	0.00	0.00	**1.46**	**14.6**	0.19	**1.93**
Chromium	0.00	0.01	0.00	0.00	0.03	0.26	0.00	0.05
Cobalt	0.00	0.01	0.00	0.00	0.01	0.04	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.08	0.11	0.01	0.02
Lead	0.00	0.01	0.00	0.00	0.05	0.55	0.01	0.10
Manganese	0.02	0.06	0.00	0.01	0.05	0.17	0.01	0.02
Molybdenum	0.00	0.01	0.00	0.00	0.05	0.52	0.01	0.07
Nickel	0.00	0.00	0.00	0.00	0.04	0.07	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.04	0.37	0.01	0.12
Thallium	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01
Uranium	0.01	0.07	0.00	0.02	0.19	**1.92**	0.03	0.28
Vanadium	0.04	0.41	0.01	0.08	0.07	0.69	0.01	0.13
Zinc	0.00	0.01	0.00	0.00	0.51	**5.09**	0.07	0.70

	Southwest							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Cadmium	0.00	0.02	0.00	0.01	0.66	**6.58**	0.11	**1.09**
Chromium	0.00	0.00	0.00	0.00	0.01	0.12	0.00	0.03
Cobalt	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.04	0.05	0.01	0.01
Lead	0.00	0.00	0.00	0.00	0.03	0.33	0.01	0.08
Manganese	0.03	0.10	0.02	0.07	0.04	0.14	0.02	0.08
Molybdenum	0.00	0.02	0.00	0.00	0.06	0.59	0.01	0.09
Nickel	0.00	0.01	0.00	0.00	0.02	0.04	0.01	0.01
Selenium	0.01	0.05	0.00	0.01	0.33	**3.27**	0.03	0.26
Thallium	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01
Uranium	0.02	0.17	0.01	0.06	0.20	**2.04**	0.03	0.29
Vanadium	0.02	0.23	0.01	0.06	0.04	0.38	0.01	0.09
Zinc	0.00	0.02	0.00	0.00	0.26	**2.56**	0.06	0.58

	East Haul Road							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.08	0.00	0.00	0.06	0.29	0.00	0.02
Cadmium	0.00	0.01	0.00	0.00	**1.57**	**15.7**	0.22	**2.17**
Chromium	0.00	0.01	0.00	0.00	0.02	0.19	0.00	0.04
Cobalt	0.00	0.01	0.00	0.00	0.01	0.05	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.14	0.21	0.02	0.02
Lead	0.00	0.01	0.00	0.00	0.06	0.59	0.01	0.09
Manganese	0.01	0.04	0.00	0.00	0.03	0.11	0.01	0.02
Molybdenum	0.00	0.05	0.00	0.01	0.16	**1.63**	0.02	0.21
Nickel	0.00	0.00	0.00	0.00	0.05	0.09	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.04	0.41	0.01	0.13
Thallium	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01
Uranium	0.03	0.33	0.00	0.04	**1.10**	**11.0**	0.12	**1.25**
Vanadium	0.03	0.34	0.01	0.07	0.06	0.57	0.01	0.11
Zinc	0.00	0.01	0.00	0.00	0.40	**3.97**	0.07	0.72

	West Haul Road							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.03	0.00	0.00	0.02	0.09	0.00	0.01
Cadmium	0.00	0.01	0.00	0.00	**1.31**	**13.1**	0.17	**1.72**
Chromium	0.00	0.00	0.00	0.00	0.01	0.12	0.00	0.03
Cobalt	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.13	0.18	0.02	0.02
Lead	0.00	0.00	0.00	0.00	0.03	0.33	0.01	0.09
Manganese	0.01	0.04	0.00	0.01	0.03	0.10	0.01	0.03
Molybdenum	0.01	0.07	0.00	0.01	0.24	**2.41**	0.03	0.27
Nickel	0.00	0.00	0.00	0.00	0.02	0.04	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.04	0.37	0.01	0.12
Thallium	0.00	0.01	0.00	0.00	0.01	0.06	0.00	0.01
Uranium	0.09	0.93	0.01	0.12	**3.25**	**32.5**	0.36	**3.64**
Vanadium	0.02	0.23	0.01	0.06	0.04	0.39	0.01	0.10
Zinc	0.00	0.01	0.00	0.00	0.36	**3.55**	0.08	0.76

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QF. Summary of Hazard Quotient Calculations
Receptor: Deer Mouse (Omnivorous Mammal)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**2.69**	**13.6**	0.03	0.15	**2.88**	**14.5**	0.09	0.44	**2.69**	**13.6**	0.03	0.15	**2.88**	**14.5**	0.09	0.44
Cadmium	0.18	**1.78**	0.00	0.04	0.61	**6.09**	0.14	**1.36**	0.18	**1.78**	0.00	0.04	0.61	**6.09**	0.14	**1.36**
Chromium	0.13	**1.26**	0.00	0.05	0.14	**1.40**	0.01	0.09	0.13	**1.26**	0.00	0.05	0.14	**1.40**	0.01	0.09
Cobalt	0.13	0.52	0.02	0.06	0.15	0.60	0.02	0.09	0.14	0.54	0.02	0.07	0.16	0.62	0.02	0.09
Copper	0.26	0.38	0.01	0.02	0.76	**1.11**	0.17	0.25	0.26	0.38	0.01	0.02	0.77	**1.11**	0.17	0.25
Lead	0.11	**1.14**	0.00	0.03	0.13	**1.27**	0.01	0.07	0.11	**1.14**	0.00	0.03	0.13	**1.26**	0.01	0.07
Manganese	**2.29**	**7.40**	0.09	0.30	**3.13**	**10.1**	0.35	**1.13**	**2.32**	**7.51**	0.09	0.30	**3.16**	**10.2**	0.35	**1.13**
Molybdenum	**1.82**	**18.2**	0.09	0.91	N/A	N/A	N/A	N/A	**1.82**	**18.2**	0.09	0.91	N/A	N/A	N/A	N/A
Nickel	0.14	0.25	0.01	0.02	0.19	0.34	0.03	0.05	0.14	0.26	0.01	0.02	0.19	0.35	0.03	0.05
Selenium	**39.2**	**392**	0.28	**2.81**	**39.5**	**395**	0.39	**3.88**	**39.2**	**392**	0.28	**2.78**	**39.5**	**395**	0.38	**3.85**
Thallium	0.37	**3.67**	0.01	0.09	0.42	**4.21**	0.03	0.25	0.37	**3.67**	0.01	0.09	0.42	**4.21**	0.03	0.25
Uranium	**12.5**	**125**	0.71	**7.14**	**13.1**	**131**	0.91	**9.10**	**13.0**	**130**	0.72	**7.24**	**13.6**	**136**	0.92	**9.20**
Vanadium	**6.82**	**68.2**	0.23	**2.30**	N/A	N/A	N/A	N/A	**6.82**	**68.2**	0.23	**2.30**	N/A	N/A	N/A	N/A
Zinc	0.19	**1.94**	0.01	0.06	0.41	**4.11**	0.07	0.72	0.20	**1.95**	0.01	0.06	0.41	**4.12**	0.07	0.73

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.57	**2.87**	0.01	0.03	0.76	**3.81**	0.06	0.32	0.06	0.31	0.01	0.03	0.25	**1.25**	0.06	0.32
Cadmium	0.04	0.39	0.00	0.03	0.47	**4.69**	0.13	**1.35**	0.03	0.27	0.00	0.04	0.46	**4.57**	0.14	**1.36**
Chromium	0.06	0.56	0.01	0.05	0.07	0.69	0.01	0.09	0.03	0.27	0.00	0.03	0.04	0.40	0.01	0.07
Cobalt	0.09	0.34	0.01	0.04	0.11	0.42	0.02	0.06	0.05	0.19	0.01	0.02	0.07	0.26	0.01	0.05
Copper	0.10	0.14	0.01	0.01	0.61	0.88	0.16	0.24	0.05	0.07	0.01	0.01	0.55	0.81	0.16	0.24
Lead	0.04	0.37	0.00	0.03	0.05	0.49	0.01	0.07	0.02	0.22	0.00	0.03	0.03	0.34	0.01	0.07
Manganese	0.83	**2.68**	0.05	0.17	**1.67**	**5.38**	0.31	**1.00**	0.40	**1.28**	0.07	0.22	**1.23**	**3.98**	0.32	**1.05**
Molybdenum	0.09	0.91	0.01	0.07	N/A	N/A	N/A	N/A	0.10	**1.03**	0.01	0.08	N/A	N/A	N/A	N/A
Nickel	0.06	0.11	0.01	0.01	0.11	0.20	0.02	0.04	0.05	0.08	0.01	0.01	0.10	0.17	0.02	0.04
Selenium	0.04	0.38	0.01	0.06	0.39	**3.86**	0.11	**1.13**	0.33	**3.31**	0.01	0.13	0.68	**6.79**	0.12	**1.20**
Thallium	0.03	0.30	0.00	0.04	0.08	0.84	0.02	0.20	0.02	0.25	0.00	0.03	0.08	0.79	0.02	0.19
Uranium	0.34	**3.43**	0.03	0.25	0.98	**9.83**	0.22	**2.21**	0.40	**3.98**	0.03	0.30	**1.04**	**10.4**	0.23	**2.26**
Vanadium	**2.57**	**25.7**	0.25	**2.51**	N/A	N/A	N/A	N/A	**1.44**	**14.4**	0.18	**1.79**	N/A	N/A	N/A	N/A
Zinc	0.06	0.57	0.00	0.04	0.27	**2.74**	0.07	0.70	0.03	0.34	0.00	0.04	0.25	**2.51**	0.07	0.70

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**1.04**	**5.25**	0.03	0.15	**1.23**	**6.19**	0.09	0.44	0.34	**1.71**	0.02	0.11	0.52	**2.65**	0.08	0.39
Cadmium	0.04	0.41	0.00	0.03	0.47	**4.72**	0.13	**1.35**	0.03	0.35	0.00	0.02	0.47	**4.65**	0.13	**1.34**
Chromium	0.04	0.41	0.00	0.04	0.05	0.54	0.01	0.08	0.03	0.27	0.00	0.03	0.04	0.40	0.01	0.07
Cobalt	0.11	0.42	0.01	0.03	0.13	0.50	0.01	0.05	0.04	0.16	0.01	0.02	0.06	0.24	0.01	0.05
Copper	0.18	0.26	0.01	0.01	0.69	**1.00**	0.16	0.24	0.16	0.23	0.01	0.02	0.67	0.97	0.17	0.24
Lead	0.04	0.39	0.00	0.03	0.05	0.52	0.01	0.07	0.02	0.22	0.00	0.03	0.03	0.34	0.01	0.07
Manganese	0.49	**1.60**	0.05	0.15	**1.33**	**4.30**	0.30	0.98	0.47	**1.52**	0.05	0.17	**1.31**	**4.22**	0.31	**1.00**
Molybdenum	0.29	**2.86**	0.02	0.18	N/A	N/A	N/A	N/A	0.42	**4.23**	0.02	0.24	N/A	N/A	N/A	N/A
Nickel	0.08	0.14	0.01	0.01	0.13	0.23	0.02	0.04	0.03	0.06	0.00	0.01	0.08	0.15	0.02	0.04
Selenium	0.04	0.42	0.01	0.07	0.39	**3.90**	0.11	**1.13**	0.04	0.39	0.01	0.06	0.39	**3.87**	0.11	**1.13**
Thallium	0.04	0.38	0.00	0.04	0.09	0.91	0.02	0.21	0.07	0.72	0.01	0.06	0.13	**1.26**	0.02	0.22
Uranium	**1.93**	**19.3**	0.11	**1.11**	**2.57**	**25.7**	0.31	**3.07**	**5.70**	**57.0**	0.32	**3.24**	**6.34**	**63.4**	0.52	**5.20**
Vanadium	**2.12**	**21.2**	0.21	**2.10**	N/A	N/A	N/A	N/A	**1.46**	**14.6**	0.19	**1.90**	N/A	N/A	N/A	N/A
Zinc	0.04	0.44	0.00	0.04	0.26	**2.61**	0.07	0.71	0.04	0.40	0.00	0.04	0.26	**2.57**	0.07	0.71

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QB. Summary of Hazard Quotient Calculations
Receptor: White-tailed Deer (Herbivorous Mammal)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.75	**3.79**	0.00	0.01	0.78	**3.94**	0.01	0.06	0.75	**3.79**	0.00	0.01	0.78	**3.94**	0.01	0.06
Cadmium	0.06	0.65	0.00	0.01	0.13	**1.29**	0.02	0.21	0.06	0.65	0.00	0.01	0.13	**1.29**	0.02	0.21
Chromium	0.04	0.36	0.00	0.00	0.04	0.36	0.00	0.01	0.04	0.36	0.00	0.00	0.04	0.36	0.00	0.01
Cobalt	0.06	0.26	0.00	0.01	0.06	0.26	0.00	0.01	0.07	0.28	0.00	0.02	0.07	0.29	0.00	0.02
Copper	0.08	0.11	0.00	0.00	0.09	0.13	0.00	0.01	0.08	0.11	0.00	0.00	0.09	0.13	0.00	0.01
Lead	0.03	0.32	0.00	0.00	0.03	0.33	0.00	0.00	0.03	0.32	0.00	0.00	0.03	0.32	0.00	0.00
Manganese	0.86	**2.78**	0.02	0.07	**1.02**	**3.30**	0.07	0.23	0.91	**2.94**	0.02	0.07	**1.07**	**3.46**	0.07	0.23
Molybdenum	0.51	**5.08**	0.01	0.06	N/A	N/A	N/A	N/A	0.51	**5.08**	0.01	0.06	N/A	N/A	N/A	N/A
Nickel	0.07	0.12	0.00	0.00	0.08	0.14	0.01	0.01	0.07	0.13	0.00	0.00	0.08	0.15	0.01	0.01
Selenium	**11.1**	**111**	0.02	0.22	**11.1**	**111**	0.03	0.27	**11.1**	**111**	0.02	0.21	**11.1**	**111**	0.03	0.25
Thallium	0.10	**1.02**	0.00	0.01	0.11	**1.07**	0.00	0.02	0.10	**1.02**	0.00	0.01	0.11	**1.07**	0.00	0.02
Uranium	**5.86**	**58.6**	0.20	**2.04**	**5.93**	**59.3**	0.22	**2.24**	**6.60**	**66.0**	0.21	**2.09**	**6.66**	**66.6**	0.23	**2.28**
Vanadium	**1.90**	**19.0**	0.02	0.16	N/A	N/A	N/A	N/A	**1.90**	**19.0**	0.02	0.16	N/A	N/A	N/A	N/A
Zinc	0.07	0.66	0.00	0.01	0.08	0.79	0.01	0.05	0.07	0.68	0.00	0.01	0.08	0.80	0.01	0.05

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.16	0.80	0.00	0.00	0.19	0.95	0.01	0.05	0.02	0.09	0.00	0.00	0.05	0.24	0.01	0.05
Cadmium	0.01	0.12	0.00	0.00	0.08	0.76	0.02	0.20	0.02	0.19	0.00	0.01	0.08	0.83	0.02	0.21
Chromium	0.02	0.16	0.00	0.00	0.02	0.17	0.00	0.01	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.00
Cobalt	0.02	0.10	0.00	0.00	0.02	0.10	0.00	0.00	0.01	0.06	0.00	0.00	0.02	0.06	0.00	0.00
Copper	0.03	0.04	0.00	0.00	0.04	0.06	0.00	0.01	0.01	0.02	0.00	0.00	0.02	0.04	0.00	0.01
Lead	0.01	0.10	0.00	0.00	0.01	0.11	0.00	0.00	0.01	0.06	0.00	0.00	0.01	0.07	0.00	0.00
Manganese	0.26	0.84	0.00	0.01	0.42	**1.36**	0.05	0.17	0.28	0.90	0.02	0.05	0.44	**1.42**	0.07	0.22
Molybdenum	0.03	0.25	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.29	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.02	0.04	0.00	0.00	0.03	0.05	0.00	0.01	0.03	0.05	0.00	0.00	0.04	0.07	0.00	0.01
Selenium	0.01	0.12	0.00	0.01	0.03	0.26	0.00	0.05	0.09	0.93	0.00	0.01	0.11	**1.07**	0.01	0.05
Thallium	0.01	0.09	0.00	0.00	0.01	0.14	0.00	0.02	0.01	0.07	0.00	0.00	0.01	0.12	0.00	0.02
Uranium	0.11	**1.09**	0.00	0.02	0.17	**1.70**	0.02	0.22	0.18	**1.83**	0.01	0.05	0.24	**2.45**	0.02	0.25
Vanadium	0.72	**7.17**	0.02	0.18	N/A	N/A	N/A	N/A	0.40	**4.02**	0.01	0.13	N/A	N/A	N/A	N/A
Zinc	0.02	0.17	0.00	0.00	0.03	0.29	0.00	0.04	0.02	0.16	0.00	0.00	0.03	0.29	0.00	0.04

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.29	**1.47**	0.00	0.01	0.32	**1.62**	0.01	0.06	0.09	0.48	0.00	0.01	0.12	0.62	0.01	0.05
Cadmium	0.01	0.12	0.00	0.00	0.08	0.77	0.02	0.20	0.01	0.11	0.00	0.00	0.08	0.75	0.02	0.20
Chromium	0.01	0.11	0.00	0.00	0.01	0.12	0.00	0.01	0.01	0.08	0.00	0.00	0.01	0.08	0.00	0.00
Cobalt	0.03	0.12	0.00	0.00	0.03	0.12	0.00	0.00	0.01	0.05	0.00	0.00	0.01	0.05	0.00	0.00
Copper	0.05	0.07	0.00	0.00	0.06	0.09	0.00	0.01	0.05	0.07	0.00	0.00	0.06	0.08	0.00	0.01
Lead	0.01	0.11	0.00	0.00	0.01	0.11	0.00	0.00	0.01	0.06	0.00	0.00	0.01	0.07	0.00	0.00
Manganese	0.17	0.54	0.00	0.01	0.33	**1.06**	0.05	0.17	0.16	0.52	0.01	0.02	0.32	**1.04**	0.06	0.18
Molybdenum	0.08	0.80	0.00	0.01	N/A	N/A	N/A	N/A	0.12	**1.18**	0.00	0.02	N/A	N/A	N/A	N/A
Nickel	0.03	0.05	0.00	0.00	0.03	0.06	0.00	0.01	0.01	0.03	0.00	0.00	0.02	0.04	0.00	0.01
Selenium	0.01	0.13	0.00	0.01	0.03	0.27	0.00	0.05	0.01	0.13	0.00	0.01	0.03	0.27	0.01	0.05
Thallium	0.01	0.11	0.00	0.00	0.02	0.16	0.00	0.02	0.02	0.20	0.00	0.00	0.03	0.25	0.00	0.02
Uranium	0.55	**5.52**	0.01	0.08	0.61	**6.14**	0.03	0.28	**1.60**	**16.0**	0.02	0.24	**1.66**	**16.6**	0.04	0.43
Vanadium	0.59	**5.92**	0.01	0.15	N/A	N/A	N/A	N/A	0.41	**4.08**	0.01	0.13	N/A	N/A	N/A	N/A
Zinc	0.01	0.13	0.00	0.00	0.03	0.26	0.00	0.04	0.01	0.12	0.00	0.00	0.02	0.25	0.00	0.04

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
$HQ < 1.0$
$HQ \geq 1.0$

Table QQ. Summary of Hazard Quotient Calculations
Receptor: Great Blue Heron (Piscivorous Bird)
Instream Sediments
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Pit 3							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.25	0.99	0.11	0.45
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.31	0.43	0.14	0.20
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.12	1.24	0.07	0.66
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

	Pit 4							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.08	0.12	0.01	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.02	0.17	0.01	0.10
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Pollution Control Pond							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.01			0.25	0.99	0.11	0.46
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.01	0.01			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.01			0.35	0.49	0.16	0.22
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.02			0.16	1.55	0.07	0.68
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.05			N/A	N/A	N/A	N/A

	Blood Pool							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.03	0.13	0.02	0.06
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.16	0.22	0.07	0.10
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.04	0.42	0.02	0.20
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

	Outfall							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.01	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.01
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

b) PIA: Western, Central, and Eastern Drainages

	Western Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.07	0.01	0.03
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.05	0.07	0.02	0.03
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Central Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.19	0.75	0.10	0.41
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.18	0.24	0.10	0.14
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.00	0.04	0.00	0.02
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

	Upper Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.06	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.04	0.06	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.04	0.00	0.02
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.02	0.02	0.00	0.01
Selenium	0.01	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

c). PIA: Blue Creek

	Upper Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.02	0.00	0.02
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.04	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.02			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.01	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

	Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.03	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	FDR Lake							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.01	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QO. Summary of Hazard Quotient Calculations
Receptor: Great Horned Owl (Carnivorous Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.31	**1.25**	0.00	0.00	0.36	**1.45**	0.00	0.01	0.31	**1.25**	0.00	0.00	0.36	**1.45**	0.00	0.01
Cadmium	0.03	0.13	0.00	0.00	**4.98**	**19.9**	0.12	0.47	0.03	0.13	0.00	0.00	**4.98**	**19.9**	0.12	0.47
Chromium	0.39	**1.97**	0.00	0.02	**1.12**	**5.61**	0.06	0.31	0.39	**1.97**	0.00	0.02	**1.12**	**5.61**	0.06	0.31
Cobalt	0.02	0.03	0.00	0.00	0.02	0.04	0.00	0.00	0.02	0.03	0.00	0.00	0.02	0.04	0.00	0.01
Copper	0.07	0.09	0.00	0.00	0.32	0.39	0.02	0.03	0.08	0.09	0.00	0.00	0.32	0.39	0.02	0.03
Lead	0.17	**1.67**	0.00	0.01	**1.20**	**12.0**	0.06	0.63	0.17	**1.67**	0.00	0.01	**1.20**	**12.0**	0.06	0.63
Manganese	0.02	0.17	0.00	0.01	0.02	0.20	0.00	0.01	0.02	0.17	0.00	0.01	0.02	0.20	0.00	0.01
Molybdenum	0.03	0.27	0.00	0.00	0.09	0.89	0.01	0.06	0.03	0.27	0.00	0.00	0.09	0.89	0.01	0.06
Nickel	0.02	0.03	0.00	0.00	0.06	0.09	0.01	0.01	0.02	0.03	0.00	0.00	0.06	0.09	0.01	0.01
Selenium	**3.35**	**6.70**	0.01	0.01	**17.0**	**34.0**	0.20	0.39	**3.35**	**6.71**	0.01	0.01	**17.0**	**34.0**	0.20	0.39
Thallium	0.06	0.62	0.00	0.00	0.08	0.80	0.00	0.01	0.06	0.62	0.00	0.00	0.08	0.80	0.00	0.01
Uranium	0.01	0.10	0.00	0.01	0.03	0.31	0.00	0.02	0.01	0.10	0.00	0.01	0.03	0.31	0.00	0.02
Vanadium	0.03	0.34	0.00	0.00	0.04	0.36	0.00	0.00	0.03	0.34	0.00	0.00	0.04	0.36	0.00	0.00
Zinc	0.05	**1.11**	0.00	0.02	**1.98**	**42.1**	0.08	**1.79**	0.05	**1.12**	0.00	0.02	**1.98**	**42.1**	0.08	**1.79**

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.07	0.26	0.00	0.00	0.08	0.31	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.03	0.00	0.00
Cadmium	0.01	0.03	0.00	0.00	**1.14**	**4.55**	0.15	0.61	0.00	0.02	0.00	0.00	0.51	**2.05**	0.09	0.34
Chromium	0.17	0.87	0.00	0.02	0.49	**2.47**	0.06	0.31	0.08	0.41	0.00	0.01	0.24	**1.18**	0.04	0.18
Cobalt	0.01	0.02	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.02	0.00	0.00
Copper	0.03	0.04	0.00	0.00	0.12	0.15	0.02	0.02	0.01	0.02	0.00	0.00	0.06	0.07	0.01	0.01
Lead	0.05	0.54	0.00	0.01	0.39	**3.86**	0.06	0.60	0.03	0.32	0.00	0.01	0.23	**2.29**	0.05	0.53
Manganese	0.01	0.06	0.00	0.00	0.01	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.01
Molybdenum	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.05	0.00	0.01
Nickel	0.01	0.01	0.00	0.00	0.03	0.04	0.00	0.01	0.01	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Selenium	0.00	0.01	0.00	0.00	0.02	0.03	0.00	0.01	0.03	0.06	0.00	0.00	0.14	0.29	0.01	0.02
Thallium	0.01	0.05	0.00	0.00	0.01	0.06	0.00	0.01	0.00	0.04	0.00	0.00	0.01	0.05	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.01	0.13	0.00	0.00	0.01	0.14	0.00	0.00	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.00
Zinc	0.02	0.33	0.00	0.01	0.60	**12.8**	0.08	**1.74**	0.01	0.18	0.00	0.01	0.30	**6.44**	0.07	**1.44**

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.12	0.48	0.00	0.00	0.14	0.56	0.00	0.01	0.04	0.16	0.00	0.00	0.05	0.18	0.00	0.01
Cadmium	0.01	0.03	0.00	0.00	**1.22**	**4.89**	0.17	0.68	0.01	0.03	0.00	0.00	**1.02**	**4.10**	0.14	0.54
Chromium	0.13	0.63	0.00	0.01	0.36	**1.80**	0.05	0.24	0.08	0.42	0.00	0.01	0.24	**1.19**	0.04	0.19
Cobalt	0.01	0.02	0.00	0.00	0.02	0.04	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00
Copper	0.05	0.06	0.00	0.00	0.22	0.27	0.02	0.02	0.05	0.06	0.00	0.00	0.20	0.25	0.02	0.02
Lead	0.06	0.57	0.00	0.01	0.41	**4.11**	0.05	0.54	0.03	0.32	0.00	0.01	0.23	**2.32**	0.06	0.56
Manganese	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.04	0.00	0.00
Molybdenum	0.00	0.04	0.00	0.00	0.01	0.14	0.00	0.01	0.01	0.06	0.00	0.00	0.02	0.21	0.00	0.02
Nickel	0.01	0.02	0.00	0.00	0.04	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.00
Selenium	0.00	0.01	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Thallium	0.01	0.06	0.00	0.00	0.01	0.08	0.00	0.01	0.01	0.12	0.00	0.00	0.02	0.16	0.00	0.01
Uranium	0.00	0.02	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.05	0.00	0.00	0.02	0.16	0.00	0.01
Vanadium	0.01	0.11	0.00	0.00	0.01	0.11	0.00	0.00	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.00
Zinc	0.01	0.26	0.00	0.01	0.47	**10.0**	0.08	**1.78**	0.01	0.23	0.00	0.01	0.42	**8.9**	0.09	**1.89**

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QP. Summary of Hazard Quotient Calculations
Receptor: American Kestrel (Carnivorous Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.33	**1.34**	0.00	0.01	0.39	**1.56**	0.01	0.02	0.33	**1.34**	0.00	0.01	0.39	**1.56**	0.01	0.02
Cadmium	0.04	0.14	0.00	0.01	**5.33**	**21.3**	0.36	**1.45**	0.04	0.14	0.00	0.01	**5.33**	**21.3**	0.36	**1.45**
Chromium	0.42	**2.11**	0.01	0.05	**1.20**	**6.01**	0.19	0.95	0.42	**2.11**	0.01	0.05	**1.20**	**6.01**	0.19	0.95
Cobalt	0.02	0.03	0.00	0.01	0.02	0.04	0.01	0.01	0.02	0.03	0.00	0.01	0.02	0.05	0.01	0.01
Copper	0.08	0.10	0.00	0.00	0.34	0.42	0.08	0.09	0.08	0.10	0.00	0.00	0.34	0.42	0.08	0.09
Lead	0.18	**1.79**	0.00	0.04	**1.28**	**12.8**	0.20	**1.96**	0.18	**1.79**	0.00	0.04	**1.28**	**12.8**	0.20	**1.95**
Manganese	0.02	0.18	0.00	0.01	0.02	0.22	0.00	0.02	0.02	0.19	0.00	0.01	0.02	0.22	0.00	0.02
Molybdenum	0.03	0.29	0.00	0.01	0.10	0.95	0.02	0.20	0.03	0.29	0.00	0.01	0.10	0.95	0.02	0.20
Nickel	0.02	0.03	0.00	0.00	0.07	0.09	0.02	0.03	0.02	0.03	0.00	0.00	0.07	0.10	0.02	0.03
Selenium	**3.59**	**7.19**	0.02	0.04	**18.2**	**36.4**	0.61	**1.22**	**3.59**	**7.19**	0.02	0.03	**18.2**	**36.4**	0.61	**1.22**
Thallium	0.07	0.66	0.00	0.01	0.09	0.85	0.00	0.04	0.07	0.66	0.00	0.01	0.09	0.85	0.00	0.04
Uranium	0.01	0.11	0.00	0.01	0.03	0.34	0.00	0.05	0.01	0.12	0.00	0.02	0.03	0.34	0.00	0.05
Vanadium	0.04	0.37	0.00	0.01	0.04	0.39	0.00	0.01	0.04	0.37	0.00	0.01	0.04	0.39	0.00	0.01
Zinc	0.06	**1.22**	0.00	0.06	**2.12**	**45.1**	0.26	**5.54**	0.06	**1.23**	0.00	0.06	**2.12**	**45.2**	0.26	**5.54**

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.07	0.28	0.00	0.00	0.08	0.33	0.00	0.01	0.01	0.03	0.00	0.00	0.01	0.04	0.00	0.01
Cadmium	0.01	0.03	0.00	0.00	**1.22**	**4.87**	0.47	**1.88**	0.01	0.02	0.00	0.01	0.55	**2.20**	0.26	**1.06**
Chromium	0.19	0.93	0.01	0.05	0.53	**2.65**	0.19	0.96	0.09	0.44	0.01	0.03	0.25	**1.27**	0.11	0.57
Cobalt	0.01	0.02	0.00	0.00	0.02	0.03	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.00	0.00
Copper	0.03	0.04	0.00	0.00	0.13	0.16	0.05	0.06	0.02	0.02	0.00	0.00	0.06	0.08	0.04	0.05
Lead	0.06	0.58	0.00	0.03	0.41	**4.13**	0.19	**1.86**	0.03	0.34	0.00	0.03	0.25	**2.45**	0.16	**1.64**
Manganese	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.01
Molybdenum	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.05	0.00	0.02
Nickel	0.01	0.01	0.00	0.00	0.03	0.04	0.01	0.02	0.01	0.01	0.00	0.00	0.02	0.03	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.03	0.03	0.06	0.00	0.00	0.15	0.31	0.03	0.06
Thallium	0.01	0.05	0.00	0.01	0.01	0.07	0.00	0.02	0.00	0.05	0.00	0.00	0.01	0.06	0.00	0.01
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.01	0.14	0.00	0.01	0.01	0.14	0.00	0.01	0.01	0.08	0.00	0.01	0.01	0.08	0.00	0.01
Zinc	0.02	0.36	0.00	0.02	0.65	**13.7**	0.25	**5.41**	0.01	0.21	0.00	0.03	0.32	**6.91**	0.21	**4.47**

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.13	0.52	0.00	0.01	0.15	0.60	0.01	0.02	0.04	0.17	0.00	0.01	0.05	0.20	0.00	0.02
Cadmium	0.01	0.03	0.00	0.00	**1.31**	**5.24**	0.53	**2.11**	0.01	0.03	0.00	0.00	**1.10**	**4.39**	0.42	**1.68**
Chromium	0.14	0.68	0.01	0.04	0.39	**1.93**	0.15	0.74	0.09	0.45	0.01	0.03	0.26	**1.28**	0.12	0.60
Cobalt	0.01	0.03	0.00	0.00	0.02	0.04	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00
Copper	0.06	0.07	0.00	0.00	0.24	0.29	0.06	0.07	0.05	0.06	0.00	0.00	0.21	0.26	0.06	0.08
Lead	0.06	0.61	0.00	0.03	0.44	**4.40**	0.17	**1.67**	0.03	0.35	0.00	0.03	0.25	**2.48**	0.17	**1.74**
Manganese	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.01
Molybdenum	0.00	0.04	0.00	0.00	0.01	0.15	0.00	0.04	0.01	0.07	0.00	0.00	0.02	0.22	0.01	0.05
Nickel	0.01	0.02	0.00	0.00	0.04	0.06	0.01	0.02	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.02	0.04	0.01	0.03	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.03
Thallium	0.01	0.07	0.00	0.01	0.01	0.09	0.00	0.02	0.01	0.13	0.00	0.01	0.02	0.17	0.00	0.02
Uranium	0.00	0.02	0.00	0.00	0.01	0.06	0.00	0.01	0.01	0.05	0.00	0.00	0.02	0.17	0.00	0.04
Vanadium	0.01	0.11	0.00	0.01	0.01	0.12	0.00	0.01	0.01	0.08	0.00	0.01	0.01	0.08	0.00	0.01
Zinc	0.01	0.28	0.00	0.02	0.50	**10.7**	0.26	**5.54**	0.01	0.25	0.00	0.02	0.45	**9.6**	0.28	**5.87**

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QK. Summary of Hazard Quotient Calculations
Receptor: Mallard Duck (Omnivorous Bird)
Instream Sediments
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Pit 3							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.19	0.77	0.00	0.01				
Barium	0.10	0.20	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.02	0.00	0.00				
Cobalt	0.12	0.22	0.00	0.01				
Copper	0.25	0.31	0.01	0.01				
Manganese	0.01	0.12	0.00	0.01				
Nickel	0.09	0.13	0.00	0.00				
Selenium	0.07	0.13	0.00	0.01				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.05	0.47	0.00	0.02				
Vanadium	0.03	0.29	0.00	0.01				
Zinc	0.12	**2.45**	0.00	0.09				

	Pit 4							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.09	0.36	0.00	0.01				
Barium	0.03	0.05	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.01	0.00	0.00				
Cobalt	0.04	0.08	0.00	0.00				
Copper	0.06	0.08	0.00	0.00				
Manganese	0.01	0.15	0.00	0.00				
Nickel	0.04	0.06	0.00	0.00				
Selenium	0.05	0.09	0.00	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.04	0.39	0.00	0.01				
Vanadium	0.03	0.32	0.00	0.01				
Zinc	0.03	0.61	0.00	0.01				

	Pollution Control Pond							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.09	0.37	0.00	0.01				
Barium	0.13	0.27	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.27	**1.06**	0.00	0.02				
Cobalt	0.31	0.58	0.01	0.01				
Copper	**1.82**	**2.24**	0.03	0.04				
Manganese	0.04	0.37	0.00	0.01				
Nickel	0.77	**1.07**	0.01	0.02				
Selenium	0.06	0.11	0.00	0.00				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.29	**2.92**	0.01	0.05				
Vanadium	0.01	0.11	0.00	0.00				
Zinc	0.36	**7.66**	0.01	0.14				

	Blood Pool							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.26	**1.06**	0.01	0.03				
Barium	0.03	0.05	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.01	0.00	0.00				
Cobalt	0.02	0.04	0.00	0.00				
Copper	0.22	0.27	0.01	0.01				
Manganese	0.00	0.03	0.00	0.00				
Nickel	0.03	0.04	0.00	0.00				
Selenium	0.06	0.12	0.00	0.00				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.01	0.06	0.00	0.00				
Vanadium	0.05	0.47	0.00	0.01				
Zinc	0.03	0.58	0.00	0.02				

	Outfall							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.29	**1.16**	0.01	0.03				
Barium	0.02	0.04	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.02	0.07	0.00	0.00				
Cobalt	0.04	0.08	0.00	0.00				
Copper	0.14	0.17	0.00	0.01				
Manganese	0.03	0.25	0.00	0.01				
Nickel	0.04	0.05	0.00	0.00				
Selenium	0.07	0.13	0.00	0.00				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.02	0.20	0.00	0.01				
Vanadium	0.02	0.23	0.00	0.01				
Zinc	0.05	**1.09**	0.00	0.03				

b) PIA: Western, Central, and Eastern Drainages

	Western Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.02	0.08	0.00	0.00	0.03	0.13	0.01	0.04
Barium	0.01	0.03	0.00	0.00	0.02	0.05	0.01	0.02
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.09	0.00	0.00	0.06	0.23	0.03	0.11
Cobalt	0.02	0.04	0.00	0.00	0.06	0.11	0.03	0.05
Copper	0.05	0.06	0.00	0.00	0.19	0.23	0.11	0.14
Manganese	0.03	0.26	0.00	0.00	0.13	**1.26**	0.08	0.80
Nickel	0.03	0.04	0.00	0.00	0.08	0.11	0.04	0.06
Selenium	0.40	0.80	0.01	0.02	0.43	0.87	0.03	0.07
Silver	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.04
Uranium	0.01	0.15	0.00	0.00	0.06	0.56	0.03	0.33
Vanadium	0.01	0.09	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.72	0.00	0.01	0.07	**1.59**	0.03	0.71

	Central Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.04	0.16	0.00	0.00	0.05	0.21	0.01	0.04
Barium	0.02	0.05	0.00	0.00	0.03	0.07	0.01	0.02
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.07	0.27	0.00	0.01	0.10	0.40	0.03	0.12
Cobalt	0.18	0.35	0.00	0.01	0.22	0.41	0.03	0.06
Copper	0.07	0.09	0.00	0.00	0.21	0.26	0.11	0.14
Manganese	0.04	0.39	0.00	0.01	0.14	**1.40**	0.08	0.81
Nickel	0.24	0.32	0.01	0.01	0.29	0.40	0.05	0.06
Selenium	0.52	**1.04**	0.01	0.02	0.55	**1.11**	0.03	0.07
Silver	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.04
Uranium	0.18	**1.83**	0.00	0.03	0.22	**2.25**	0.04	0.36
Vanadium	0.02	0.20	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.22	**4.60**	0.00	0.09	0.26	**5.48**	0.04	0.78

	Upper Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.06	0.25	0.00	0.00	0.07	0.29	0.01	0.04
Barium	0.03	0.05	0.00	0.00	0.04	0.08	0.01	0.02
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.07	0.00	0.00	0.12	0.47	0.08	0.32
Cobalt	0.04	0.08	0.00	0.00	0.06	0.11	0.01	0.03
Copper	0.07	0.09	0.00	0.00	0.13	0.16	0.05	0.06
Manganese	0.02	0.19	0.00	0.00	0.07	0.72	0.04	0.43
Nickel	0.04	0.05	0.00	0.00	0.09	0.12	0.04	0.06
Selenium	0.05	0.10	0.00	0.00	0.22	0.43	0.13	0.27
Silver	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Uranium	0.00	0.04	0.00	0.00	0.01	0.08	0.00	0.04
Vanadium	0.03	0.25	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.04	0.75	0.00	0.01	0.09	**1.81**	0.04	0.85

	Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.05	0.21	0.00	0.00	0.06	0.25	0.01	0.04
Barium	0.05	0.10	0.00	0.00	0.06	0.12	0.01	0.02
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.23	0.91	0.00	0.02	0.33	**1.31**	0.08	0.34
Cobalt	0.07	0.12	0.00	0.00	0.08	0.16	0.01	0.03
Copper	0.07	0.09	0.00	0.00	0.13	0.16	0.05	0.06
Manganese	0.20	**2.00**	0.00	0.04	0.25	**2.53**	0.05	0.46
Nickel	0.31	0.43	0.01	0.01	0.36	0.50	0.05	0.06
Selenium	**1.61**	**3.21**	0.03	0.05	**1.77**	**3.55**	0.16	0.32
Silver	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Uranium	0.00	0.04	0.00	0.00	0.01	0.09	0.00	0.04
Vanadium	0.02	0.24	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.14	**3.02**	0.00	0.06	0.19	**4.09**	0.04	0.90

c). PIA: Blue Creek

	Upper Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.02	0.08	0.00	0.00	0.03	0.13	0.01	0.04
Barium	0.01	0.03	0.00	0.00	0.08	0.16	0.05	0.11
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.09	0.00	0.00	0.03	0.13	0.01	0.02
Cobalt	0.03	0.05	0.00	0.00	0.04	0.07	0.01	0.01
Copper	0.01	0.01	0.00	0.00	0.08	0.10	0.06	0.07
Manganese	0.06	0.62	0.00	0.00	0.08	0.83	0.02	0.17
Nickel	0.03	0.04	0.00	0.00	0.04	0.06	0.01	0.01
Selenium	0.20	0.40	0.01	0.01	0.23	0.46	0.03	0.06
Silver	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01
Vanadium	0.01	0.06	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.31	0.00	0.00	0.04	0.82	0.02	0.41

	Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.28	**1.13**	0.00	0.00	0.30	**1.21**	0.02	0.07
Barium	0.13	0.26	0.00	0.00	0.16	0.33	0.03	0.06
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.23	0.91	0.00	0.00	0.45	**1.80**	0.18	0.71
Cobalt	0.25	0.48	0.00	0.00	0.27	0.51	0.01	0.02
Copper	0.05	0.06	0.00	0.00	0.12	0.15	0.06	0.07
Manganese	0.52	**5.21**	0.00	0.01	0.75	**7.5**	0.18	**1.84**
Nickel	0.47	0.65	0.00	0.00	0.57	0.79	0.08	0.12
Selenium	0.14	0.28	0.01	0.02	0.18	0.37	0.04	0.08
Silver	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Uranium	0.00	0.02	0.00	0.00	0.01	0.06	0.00	0.03
Vanadium	0.02	0.18	0.00	0.00	0.02	0.18	N/A	N/A
Zinc	0.19	**3.98**	0.00	0.02	0.28	**6.0**	0.08	**1.65**

	Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.04	0.17	0.00	0.00	0.06	0.25	0.02	0.07
Barium	0.03	0.05	0.00	0.00	0.06	0.12	0.03	0.06
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.09	0.00	0.00	0.25	0.99	0.18	0.71
Cobalt	0.03	0.06	0.00	0.00	0.05	0.09	0.01	0.02
Copper	0.04	0.05	0.00	0.00	0.11	0.13	0.06	0.07
Manganese	0.03	0.30	0.00	0.00	0.26	**2.60**	0.18	**1.83**
Nickel	0.05	0.07	0.00	0.00	0.16	0.22	0.08	0.11
Selenium	0.06	0.11	0.00	0.00	0.10	0.20	0.04	0.07
Silver	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
Uranium	0.00	0.01	0.00	0.00	0.01	0.06	0.00	0.03
Vanadium	0.02	0.16	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.04	0.90	0.00	0.02	0.14	**2.97**	0.08	**1.65**

	FDR Lake							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.05	0.18	0.00	0.01	0.07	0.26	0.02	0.07
Barium	0.02	0.03	0.00	0.00	0.05	0.10	0.03	0.06
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.23	0.91	0.18	0.71
Cobalt	0.01	0.02	0.00	0.00	0.03	0.05	0.01	0.02
Copper	0.03	0.03	0.00	0.00	0.10	0.12	0.06	0.07
Manganese	0.00	0.02	0.00	0.00	0.23	**2.32**	0.18	**1.82**
Nickel	0.01	0.02	0.00	0.00	0.12	0.16	0.08	0.11
Selenium	0.05	0.10	0.00	0.00	0.09	0.18	0.04	0.07
Silver	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Uranium	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.03
Vanadium	0.02	0.18	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.06	**1.18**	0.00	0.04	0.15	**3.24**	0.08	**1.67**

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table QI. Summary of Hazard Quotient Calculations
Receptor: Masked Shrew (Soil Invertebrate Feeding Mammal)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**2.91**	**14.6**	0.06	0.33	**51.9**	**262**	**1.15**	**5.78**	**2.91**	**14.6**	0.06	0.32	**51.9**	**262**	**1.15**	**5.78**
Cadmium	0.20	**2.02**	0.01	0.14	**617**	**6169**	**14.2**	**142**	0.20	**2.02**	0.01	0.15	**617**	**6169**	**14.2**	**142**
Chromium	0.14	**1.36**	0.01	0.11	**28.4**	**284**	**2.21**	**22.1**	0.14	**1.36**	0.01	0.11	**28.4**	**284**	**2.21**	**22.1**
Cobalt	0.16	0.64	0.05	0.19	0.84	**3.36**	0.17	0.68	0.17	0.67	0.05	0.21	0.85	**3.40**	0.18	0.70
Copper	0.28	0.41	0.03	0.05	**27.7**	**40.4**	**2.66**	**3.88**	0.28	0.41	0.03	0.04	**27.7**	**40.4**	**2.66**	**3.88**
Lead	0.12	**1.23**	0.01	0.07	**511**	**5113**	**30.2**	**302**	0.12	**1.23**	0.01	0.07	**511**	**5113**	**30.2**	**302**
Manganese	**2.62**	**8.45**	0.29	0.93	**12.0**	**38.9**	0.75	**2.43**	**2.68**	**8.66**	0.29	0.94	**12.1**	**39.1**	0.75	**2.44**
Molybdenum	**1.96**	**19.6**	0.19	**1.92**	**76.8**	**768**	**7.52**	**75.2**	**1.96**	**19.6**	0.19	**1.92**	**76.8**	**768**	**7.52**	**75.2**
Nickel	0.17	0.31	0.03	0.06	**17.6**	**32.0**	**2.00**	**3.64**	0.17	0.32	0.04	0.07	**17.6**	**32.0**	**2.00**	**3.65**
Selenium	**42.3**	**423**	0.61	**6.11**	**10588**	**105876**	**146**	**1462**	**42.3**	**423**	0.60	**5.97**	**10588**	**105876**	**146**	**1461**
Thallium	0.40	**3.95**	0.02	0.19	**7.60**	**76.0**	0.35	**3.50**	0.40	**3.95**	0.02	0.18	**7.60**	**76.0**	0.35	**3.49**
Uranium	**15.0**	**150**	**2.48**	**24.8**	**28.0**	**280**	**3.16**	**31.6**	**16.0**	**160**	**2.53**	**25.3**	**28.9**	**289**	**3.21**	**32.1**
Vanadium	**7.35**	**73.5**	0.49	**4.86**	**19.2**	**192**	**1.27**	**12.7**	**7.35**	**73.5**	0.49	**4.86**	**19.2**	**192**	**1.27**	**12.7**
Zinc	0.22	**2.17**	0.02	0.17	**179**	**1790**	**7.60**	**76.0**	0.22	**2.19**	0.02	0.17	**179**	**1790**	**7.60**	**76.0**

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.61	**3.10**	0.01	0.07	**11.0**	**55.3**	0.26	**1.29**	0.07	0.34	0.01	0.07	**1.19**	**6.02**	0.26	**1.30**
Cadmium	0.04	0.42	0.01	0.06	**141**	**1410**	**18.6**	**186**	0.04	0.36	0.01	0.12	**63.5**	**635**	**10.4**	**104**
Chromium	0.06	0.60	0.01	0.11	**12.5**	**125**	**2.23**	**22.3**	0.03	0.29	0.01	0.06	**5.99**	**59.9**	**1.32**	**13.2**
Cobalt	0.09	0.37	0.02	0.08	0.63	**2.52**	0.14	0.55	0.05	0.20	0.01	0.05	0.34	**1.34**	0.08	0.33
Copper	0.11	0.16	0.02	0.03	**10.8**	**15.7**	**1.82**	**2.65**	0.05	0.08	0.01	0.02	**5.15**	**7.50**	**1.30**	**1.89**
Lead	0.04	0.40	0.01	0.07	**165**	**1650**	**28.7**	**287**	0.02	0.24	0.01	0.06	**98.0**	**980**	**25.4**	**254**
Manganese	0.92	**2.96**	0.11	0.36	**4.53**	**14.6**	0.58	**1.88**	0.54	**1.74**	0.22	0.70	**1.67**	**5.39**	0.52	**1.69**
Molybdenum	0.10	0.99	0.01	0.14	**3.85**	**38.5**	0.55	**5.46**	0.11	**1.11**	0.02	0.17	**4.34**	**43.4**	0.66	**6.57**
Nickel	0.07	0.12	0.01	0.02	**8.64**	**15.8**	**1.64**	**3.00**	0.06	0.11	0.02	0.04	**4.92**	**8.97**	**1.11**	**2.03**
Selenium	0.04	0.41	0.01	0.13	**10.0**	**100**	**3.11**	**31.1**	0.36	**3.57**	0.03	0.29	**89.4**	**894**	**7.01**	**70.1**
Thallium	0.03	0.33	0.01	0.08	0.61	**6.10**	0.14	**1.39**	0.03	0.27	0.01	0.06	0.52	**5.17**	0.12	**1.22**
Uranium	0.38	**3.78**	0.06	0.56	0.79	**7.90**	0.11	**1.14**	0.48	**4.77**	0.08	0.84	0.89	**8.93**	0.14	**1.36**
Vanadium	**2.77**	**27.7**	0.53	**5.32**	**7.20**	**72.0**	**1.39**	**13.9**	**1.55**	**15.5**	0.38	**3.78**	**4.05**	**40.5**	0.99	**9.86**
Zinc	0.06	0.62	0.01	0.08	**54.5**	**545**	**7.46**	**74.6**	0.04	0.41	0.01	0.10	**27.3**	**273**	**6.15**	**61.5**

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**1.12**	**5.66**	0.06	0.31	**20.1**	**101**	**1.10**	**5.56**	0.36	**1.84**	0.04	0.22	**6.51**	**32.8**	0.79	**3.98**
Cadmium	0.05	0.45	0.01	0.06	**152**	**1516**	**20.9**	**209**	0.04	0.38	0.01	0.05	**127**	**1269**	**16.6**	**166**
Chromium	0.04	0.44	0.01	0.08	**9.13**	**91.3**	**1.71**	**17.1**	0.03	0.29	0.01	0.07	**6.03**	**60.3**	**1.40**	**13.97**
Cobalt	0.11	0.45	0.02	0.06	0.78	**3.11**	0.11	0.44	0.04	0.17	0.01	0.05	0.30	**1.19**	0.08	0.32
Copper	0.19	0.28	0.02	0.03	**19.5**	**28.4**	**2.08**	**3.04**	0.17	0.25	0.02	0.03	**17.4**	**25.4**	**2.19**	**3.20**
Lead	0.04	0.42	0.01	0.06	**176**	**1759**	**25.8**	**258**	0.02	0.24	0.01	0.06	**99.23**	**992**	**26.9**	**269**
Manganese	0.55	**1.79**	0.10	0.33	**2.66**	**8.58**	0.52	**1.68**	0.53	**1.70**	0.12	0.38	**2.52**	**8.15**	0.54	**1.75**
Molybdenum	0.31	**3.08**	0.04	0.39	**12.0**	**120**	**1.52**	**15.2**	0.46	**4.56**	0.05	0.51	**17.8**	**178**	**1.99**	**19.9**
Nickel	0.09	0.16	0.01	0.02	**11.4**	**20.8**	**1.56**	**2.83**	0.04	0.07	0.01	0.02	**4.70**	**8.57**	**1.11**	**2.02**
Selenium	0.05	0.46	0.01	0.15	**11.2**	**112**	**3.47**	**34.7**	0.04	0.43	0.01	0.14	**10.0**	**100**	**3.11**	**31.1**
Thallium	0.04	0.41	0.01	0.09	0.76	**7.62**	0.16	**1.58**	0.08	0.78	0.01	0.12	**1.49**	**14.9**	0.23	**2.27**
Uranium	**2.09**	**20.9**	0.24	**2.38**	**4.47**	**44.7**	0.51	**5.05**	**6.15**	**61.5**	0.69	**6.89**	**13.2**	**132**	**1.47**	**14.7**
Vanadium	**2.28**	**22.8**	0.44	**4.44**	**5.94**	**59.4**	**1.16**	**11.6**	**1.58**	**15.8**	0.40	**4.01**	**4.11**	**41.1**	**1.05**	**10.5**
Zinc	0.05	0.48	0.01	0.08	**42.4**	**424**	**7.64**	**76.4**	0.04	0.44	0.01	0.10	**38.0**	**380**	**8.09**	**80.9**

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QA. Summary of Hazard Quotient Calculations
Receptor: Meadow Vole (Herbivorous Mammal)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a) Mined Area

	Mined Area (Water Concentrations from Pit 3)												Mined Area (Water Concentrations from Pollution Control Pond)											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.		Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative		Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.18	0.89	0.01	0.03	0.75	**3.76**	0.30	**1.50**	0.25	**1.27**	0.06	0.29	0.18	0.89	0.01	0.03	0.75	**3.77**	0.30	**1.50**	0.25	**1.27**	0.06	0.29
Cadmium	0.02	0.20	0.00	0.03	0.52	**5.23**	0.28	**2.84**	0.22	**2.21**	0.12	**1.17**	0.02	0.20	0.00	0.03	0.52	**5.23**	0.28	**2.84**	0.22	**2.21**	0.12	**1.18**
Chromium	0.01	0.08	0.00	0.01	0.09	0.90	0.01	0.12	0.04	0.36	0.00	0.02	0.01	0.08	0.00	0.01	0.09	0.90	0.01	0.12	0.04	0.36	0.00	0.02
Cobalt	0.02	0.10	0.01	0.04	0.24	0.96	0.03	0.11	0.10	0.41	0.01	0.05	0.03	0.11	0.01	0.04	0.24	0.98	0.03	0.13	0.10	0.42	0.01	0.05
Copper	0.02	0.03	0.00	0.00	0.97	**1.41**	0.06	0.09	0.41	0.60	0.02	0.03	0.02	0.03	0.00	0.00	0.97	**1.41**	0.06	0.09	0.41	0.60	0.02	0.03
Lead	0.01	0.08	0.00	0.01	0.14	**1.44**	0.01	0.09	0.06	0.60	0.00	0.01	0.01	0.08	0.00	0.01	0.14	**1.44**	0.01	0.09	0.06	0.60	0.00	0.01
Manganese	0.27	0.88	0.06	0.19	**1.80**	**5.83**	0.93	**3.01**	0.72	**2.33**	0.34	**1.11**	0.30	0.97	0.06	0.19	**1.83**	**5.91**	0.96	**3.09**	0.72	**2.33**	0.34	**1.11**
Molybdenum	0.12	**1.19**	0.01	0.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12	**1.19**	0.01	0.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.03	0.05	0.01	0.01	0.20	0.37	0.06	0.11	0.08	0.15	0.02	0.04	0.03	0.05	0.01	0.01	0.21	0.38	0.06	0.11	0.08	0.15	0.02	0.04
Selenium	**2.64**	**26.4**	0.05	0.54	**3.21**	**32.1**	**2.69**	**26.9**	0.30	**3.04**	0.08	0.79	**2.64**	**26.4**	0.05	0.50	**3.22**	**32.2**	**2.70**	**27.0**	0.30	**3.00**	0.08	0.75
Thallium	0.02	0.24	0.00	0.02	0.18	**1.80**	0.04	0.44	0.07	0.69	0.01	0.10	0.02	0.24	0.00	0.01	0.18	**1.80**	0.04	0.44	0.07	0.69	0.01	0.10
Uranium	**2.15**	**21.5**	0.59	**5.89**	**52.8**	**528**	**2.40**	**24.0**	**22.5**	**225**	0.70	**6.99**	**2.51**	**25.1**	0.60	**6.03**	**53.1**	**531**	**2.77**	**27.7**	**22.5**	**225**	0.71	**7.12**
Vanadium	0.45	**4.46**	0.04	0.38	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.45	**4.46**	0.04	0.38	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.02	0.19	0.00	0.03	0.21	**2.08**	0.07	0.71	0.08	0.85	0.03	0.25	0.02	0.20	0.00	0.03	0.21	**2.09**	0.07	0.72	0.08	0.85	0.03	0.25

b) PIA: Northeast and Southwest

	Northeast												Southwest											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.		Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative		Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.19	0.00	0.01	0.61	**3.06**	0.16	0.79	0.25	**1.25**	0.05	0.27	0.00	0.02	0.00	0.01	0.57	**2.89**	0.12	0.63	0.25	**1.25**	0.05	0.27
Cadmium	0.00	0.03	0.00	0.00	0.51	**5.05**	0.27	**2.67**	0.22	**2.18**	0.11	**1.15**	0.01	0.08	0.00	0.03	0.51	**5.11**	0.27	**2.72**	0.22	**2.20**	0.12	**1.17**
Chromium	0.00	0.04	0.00	0.01	0.09	0.85	0.01	0.07	0.04	0.36	0.00	0.02	0.00	0.02	0.00	0.01	0.08	0.83	0.01	0.05	0.04	0.36	0.00	0.02
Cobalt	0.01	0.02	0.00	0.01	0.22	0.89	0.01	0.04	0.10	0.38	0.00	0.01	0.00	0.02	0.00	0.01	0.22	0.88	0.01	0.03	0.10	0.38	0.00	0.01
Copper	0.01	0.01	0.00	0.00	0.95	**1.39**	0.05	0.07	0.41	0.60	0.02	0.03	0.00	0.01	0.00	0.00	0.95	**1.38**	0.04	0.06	0.41	0.60	0.02	0.03
Lead	0.00	0.02	0.00	0.01	0.14	**1.39**	0.00	0.04	0.06	0.60	0.00	0.01	0.00	0.01	0.00	0.00	0.14	**1.38**	0.00	0.03	0.06	0.60	0.00	0.01
Manganese	0.07	0.23	0.01	0.03	**1.60**	**5.17**	0.73	**2.35**	0.67	**2.17**	0.29	0.95	0.12	0.39	0.05	0.15	**1.65**	**5.33**	0.78	**2.51**	0.71	**2.29**	0.33	**1.07**
Molybdenum	0.01	0.06	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.18	0.34	0.04	0.07	0.08	0.14	0.02	0.03	0.01	0.02	0.00	0.01	0.19	0.35	0.05	0.08	0.08	0.15	0.02	0.04
Selenium	0.00	0.03	0.00	0.01	0.58	**5.81**	0.06	0.61	0.25	**2.51**	0.03	0.26	0.02	0.22	0.00	0.02	0.60	**6.00**	0.08	0.80	0.25	**2.53**	0.03	0.27
Thallium	0.00	0.03	0.00	0.01	0.16	**1.59**	0.02	0.22	0.07	0.68	0.01	0.09	0.00	0.02	0.00	0.01	0.16	**1.58**	0.02	0.21	0.07	0.68	0.01	0.09
Uranium	0.03	0.30	0.01	0.05	**50.7**	**507**	0.28	**2.83**	**21.9**	**219**	0.12	**1.15**	0.07	0.66	0.01	0.15	**50.7**	**507**	0.32	**3.20**	**21.9**	**219**	0.12	**1.24**
Vanadium	0.17	**1.69**	0.04	0.41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09	0.94	0.03	0.30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.01	0.19	**1.93**	0.06	0.56	0.08	0.82	0.02	0.23	0.01	0.06	0.00	0.01	0.19	**1.95**	0.06	0.57	0.08	0.83	0.02	0.24

c) East Haul Road and West Haul Road

	East Haul Road												West Haul Road											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.		Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative		Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.07	0.34	0.00	0.02	0.64	**3.22**	0.19	0.95	0.25	**1.27**	0.06	0.29	0.02	0.11	0.00	0.02	0.59	**2.99**	0.14	0.72	0.25	**1.26**	0.06	0.28
Cadmium	0.00	0.03	0.00	0.01	0.51	**5.06**	0.27	**2.67**	0.22	**2.18**	0.11	**1.15**	0.00	0.03	0.00	0.01	0.51	**5.05**	0.27	**2.67**	0.22	**2.18**	0.11	**1.15**
Chromium	0.00	0.03	0.00	0.01	0.08	0.84	0.01	0.06	0.04	0.36	0.00	0.02	0.00	0.02	0.00	0.01	0.08	0.83	0.01	0.05	0.04	0.36	0.00	0.02
Cobalt	0.01	0.03	0.00	0.00	0.22	0.89	0.01	0.05	0.10	0.38	0.00	0.01	0.00	0.01	0.00	0.00	0.22	0.88	0.01	0.03	0.09	0.38	0.00	0.01
Copper	0.01	0.02	0.00	0.00	0.96	**1.40**	0.05	0.08	0.41	0.60	0.02	0.03	0.01	0.02	0.00	0.00	0.96	**1.40**	0.05	0.08	0.41	0.60	0.02	0.03
Lead	0.00	0.03	0.00	0.00	0.14	**1.39**	0.00	0.04	0.06	0.60	0.00	0.01	0.00	0.01	0.00	0.01	0.14	**1.38**	0.00	0.03	0.06	0.60	0.00	0.01
Manganese	0.05	0.16	0.01	0.03	**1.58**	**5.10**	0.71	**2.28**	0.67	**2.17**	0.29	0.94	0.05	0.15	0.01	0.04	**1.58**	**5.10**	0.70	**2.28**	0.68	**2.18**	0.30	0.96
Molybdenum	0.02	0.19	0.00	0.03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03	0.28	0.00	0.04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.19	0.34	0.04	0.08	0.08	0.14	0.02	0.03	0.00	0.01	0.00	0.00	0.18	0.33	0.04	0.07	0.08	0.14	0.02	0.03
Selenium	0.00	0.03	0.00	0.01	0.58	**5.81**	0.06	0.61	0.25	**2.52**	0.03	0.26	0.00	0.04	0.00	0.02	0.58	**5.81**	0.06	0.61	0.25	**2.52**	0.03	0.27
Thallium	0.00	0.03	0.00	0.01	0.16	**1.59**	0.02	0.23	0.07	0.69	0.01	0.09	0.00	0.05	0.00	0.01	0.16	**1.61**	0.02	0.24	0.07	0.69	0.01	0.09
Uranium	0.13	**1.34**	0.02	0.20	**50.8**	**508**	0.39	**3.87**	**21.9**	**219**	0.13	**1.29**	0.38	**3.78**	0.06	0.56	**51.0**	**510**	0.63	**6.31**	**22.0**	**220**	0.17	**1.66**
Vanadium	0.14	**1.39**	0.03	0.35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10	0.96	0.03	0.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.01	0.19	**1.92**	0.05	0.55	0.08	0.82	0.02	0.23	0.00	0.03	0.00	0.01	0.19	**1.92**	0.05	0.55	0.08	0.83	0.02	0.23

PIA:	Potentially impacted area
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
N/A:	Value could not be calculated with the information available
	HQ < 1.0
	HQ $\geq$ 1.0

Table QH. Summary of Hazard Quotient Calculations
Receptor: Mink (Piscivorous Mammal)
Instream Sediments
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Pit 3							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Barium	0.01	0.14	0.00	0.02	N/A	N/A	N/A	N/A
Beryllium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Cadmium	0.00	0.04	0.00	0.03	**1.82**	**18.2**	0.35	**3.45**
Cobalt	0.01	0.05	0.01	0.03	N/A	N/A	N/A	N/A
Copper	0.01	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.07	0.21	0.05	0.15	N/A	N/A	N/A	N/A
Nickel	0.01	0.02	0.01	0.01	**2.89**	**5.26**	0.57	**1.03**
Selenium	0.04	0.38	0.01	0.09	N/A	N/A	N/A	N/A
Silver	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.89	**8.90**	0.52	**5.22**	**197**	**1969**	**44.2**	**442**
Vanadium	0.03	0.27	0.01	0.06	N/A	N/A	N/A	N/A
Zinc	0.01	0.05	0.00	0.03	N/A	N/A	N/A	N/A

	Pit 4							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.02
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.01	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.78	**1.43**	0.03	0.05
Selenium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.30	**3.00**	0.10	**1.04**	**27.2**	**272**	**6.56**	**65.6**
Vanadium	0.03	0.30	0.01	0.06	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	Pollution Control Pond							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.02	0.19	0.00	0.03	N/A	N/A	N/A	N/A
Beryllium	0.01	0.08	0.00	0.02	N/A	N/A	N/A	N/A
Cadmium	0.01	0.11	0.00	0.04	**1.83**	**18.3**	0.36	**3.55**
Cobalt	0.02	0.08	0.01	0.04	N/A	N/A	N/A	N/A
Copper	0.03	0.04	0.01	0.01	N/A	N/A	N/A	N/A
Manganese	0.09	0.30	0.05	0.15	N/A	N/A	N/A	N/A
Nickel	0.03	0.06	0.01	0.02	**3.30**	**6.01**	0.64	**1.17**
Selenium	0.04	0.41	0.01	0.05	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	**2.39**	**23.9**	0.72	**7.23**	**247**	**2474**	**45.5**	**455**
Vanadium	0.01	0.11	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.10	0.00	0.03	N/A	N/A	N/A	N/A

	Blood Pool							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.23	**2.34**	0.05	0.47
Cobalt	0.01	0.02	0.01	0.02	N/A	N/A	N/A	N/A
Copper	0.01	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Manganese	0.02	0.06	0.01	0.04	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	**1.50**	**2.73**	0.28	0.52
Selenium	0.02	0.17	0.00	0.05	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.25	**2.46**	0.14	**1.45**	**67.0**	**670**	**13.1**	**131**
Vanadium	0.04	0.43	0.01	0.12	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A

	Outfall							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.05	0.00	0.02	N/A	N/A	N/A	N/A
Arsenic	0.01	0.06	0.00	0.02	N/A	N/A	N/A	N/A
Barium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.01	0.10	0.00	0.03
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.05	0.00	0.02	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Selenium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.12	**1.18**	0.04	0.38	**2.20**	**22.0**	0.37	**3.69**
Vanadium	0.02	0.21	0.01	0.07	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

b) PIA: Western, Central, and Eastern Drainages

	Western Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.13	**1.30**	0.02	0.23
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.08	0.01	0.02	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.48	0.87	0.09	0.16
Selenium	0.02	0.23	0.00	0.05	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.08	0.83	0.01	0.14	0.92	**9.24**	0.3	**3**
Vanadium	0.01	0.08	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	Central Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.05	0.00	0.03	**1.38**	**13.8**	0.32	**3.16**
Cobalt	0.01	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.07	0.22	0.04	0.13	N/A	N/A	N/A	N/A
Nickel	0.01	0.02	0.01	0.01	**1.64**	**3.00**	0.40	0.73
Selenium	0.03	0.29	0.00	0.05	N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	**1.02**	**10.2**	0.17	**1.68**	**6.96**	**69.6**	**1.08**	**10.8**
Vanadium	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.01	0.05	0.00	0.01	N/A	N/A	N/A	N/A

	Upper Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.11	**1.15**	0.01	0.07
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.06	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.38	0.69	0.01	0.02
Selenium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.03	0.25	0.00	0.04	**1.09**	**10.9**	0.13	**1.29**
Vanadium	0.02	0.24	0.00	0.05	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.01	0.07	0.00	0.02	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.01	0.06	0.00	0.01	0.07	0.73	0.01	0.12
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.13	0.41	0.03	0.09	N/A	N/A	N/A	N/A
Nickel	0.01	0.02	0.00	0.00	0.14	0.26	0.02	0.03
Selenium	0.09	0.88	0.02	0.15	N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.03	0.25	0.01	0.06	0.66	**6.62**	0.13	**1.28**
Vanadium	0.02	0.22	0.01	0.06	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A

c). PIA: Blue Creek

	Upper Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.04	0.40	0.01	0.12
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.04	0.12	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Selenium	0.01	0.12	0.00	0.04	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.01	0.07	0.00	0.01	0.58	**5.79**	0.03	0.33
Vanadium	0.01	0.06	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A

	Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.06	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.02	0.18	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.01	0.06	0.00	0.00	0.07	0.68	0.01	0.06
Cobalt	0.01	0.04	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.33	**1.05**	0.01	0.03	N/A	N/A	N/A	N/A
Nickel	0.02	0.03	0.00	0.00	0.04	0.07	0.00	0.01
Selenium	0.01	0.10	0.01	0.07	N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.02	0.16	0.00	0.02	0.83	**8.32**	0.05	0.52
Vanadium	0.02	0.17	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	N/A	N/A	N/A	N/A

	Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.05	0.47	0.01	0.07
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.06	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00
Selenium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.01	0.09	0.00	0.02	0.23	**2.29**	0.04	0.40
Vanadium	0.02	0.16	0.00	0.04	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	FDR Lake							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.01	0.13	0.00	0.04
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.01
Vanadium	0.02	0.16	0.01	0.05	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QC 1. Summary of Hazard Quotient Calculations
Receptor: Muskrat (Herbivorous Mammal)
Instream Sediments
Midnite Mine Site
Wellpinit, WA

a) PIA: Western, Central, and Eastern Drainages

	Western Drainage								Central Drainage							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.03	N/A	N/A	N/A	N/A	0.00	0.03	0.00	0.03	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.01	0.18	0.89	0.16	0.81	0.00	0.02	0.00	0.02	0.18	0.90	0.10	0.50
Barium	0.01	0.05	0.00	0.03	0.49	4.94	0.45	4.48	0.01	0.08	0.01	0.05	0.50	4.97	0.46	4.6
Beryllium	0.00	0.02	0.00	0.01	0.69	6.92	0.63	6.29	0.00	0.02	0.00	0.02	0.69	6.92	0.15	1.50
Cadmium	0.00	0.02	0.00	0.01	0.22	2.21	0.20	2.01	0.01	0.07	0.00	0.05	0.23	2.26	0.51	5.1
Cobalt	0.00	0.01	0.00	0.01	0.47	1.88	0.43	1.71	0.02	0.07	0.01	0.04	0.49	1.94	0.17	0.67
Copper	0.00	0.00	0.00	0.00	0.70	1.01	0.63	0.92	0.00	0.00	0.00	0.00	0.70	1.02	0.26	0.38
Manganese	0.05	0.15	0.02	0.05	21.7	69.9	19.70	63.6	0.10	0.31	0.06	0.19	21.7	70.1	19.7	64
Nickel	0.00	0.01	0.00	0.00	0.57	1.04	0.52	0.95	0.02	0.04	0.01	0.03	0.59	1.08	0.49	0.90
Selenium	0.05	0.55	0.03	0.33	0.46	4.59	0.40	4.01	0.07	0.71	0.04	0.35	0.48	4.75	0.40	4.03
Silver	0.00	0.00	0.00	0.00	0.45	4.49	0.41	4.09	0.00	0.01	0.00	0.00	0.45	4.50	0.01	0.12
Uranium	0.20	2.01	0.09	0.89	79.5	795	72.3	723	2.49	24.9	1.18	11.8	81.8	818	73.4	734
Vanadium	0.02	0.21	0.02	0.15	N/A	N/A	N/A	N/A	0.05	0.46	0.02	0.21	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01	0.17	1.74	0.16	1.58	0.01	0.10	0.01	0.05	0.18	1.83	0.16	1.62

	Upper Eastern Drainage								Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.04	0.00	0.04	N/A	N/A	N/A	N/A	0.01	0.07	0.01	0.06	N/A	N/A	N/A	N/A
Arsenic	0.01	0.03	0.00	0.01	0.11	0.56	0.10	0.49	0.01	0.03	0.00	0.02	0.11	0.56	0.10	0.50
Barium	0.01	0.09	0.01	0.05	0.50	5.04	0.46	4.56	0.02	0.17	0.01	0.11	0.51	5.12	0.46	4.62
Beryllium	0.00	0.01	0.00	0.00	0.16	1.64	0.15	1.49	0.00	0.02	0.00	0.01	0.17	1.65	0.15	1.49
Cadmium	0.00	0.01	0.00	0.01	0.56	5.58	0.51	5.07	0.01	0.14	0.01	0.08	0.57	5.71	0.52	5.15
Cobalt	0.00	0.02	0.00	0.01	0.18	0.71	0.16	0.64	0.01	0.02	0.00	0.01	0.18	0.72	0.16	0.65
Copper	0.00	0.00	0.00	0.00	0.29	0.42	0.26	0.38	0.00	0.00	0.00	0.00	0.29	0.42	0.26	0.38
Manganese	0.03	0.11	0.01	0.04	11.1	35.9	10.1	32.6	0.31	1.00	0.19	0.61	11.4	36.8	10.3	33.2
Nickel	0.00	0.01	0.00	0.00	0.53	0.97	0.48	0.88	0.03	0.05	0.01	0.02	0.55	1.01	0.49	0.90
Selenium	0.01	0.07	0.01	0.06	0.41	4.11	0.37	3.74	0.22	2.18	0.11	1.12	0.62	6.22	0.48	4.80
Silver	0.00	0.01	0.00	0.01	0.01	0.14	0.01	0.12	0.00	0.01	0.00	0.01	0.01	0.13	0.01	0.12
Uranium	0.06	0.56	0.02	0.19	8.21	82.1	7.44	74.4	0.06	0.59	0.03	0.33	8.21	82.1	7.46	74.6
Vanadium	0.06	0.58	0.03	0.34	N/A	N/A	N/A	N/A	0.05	0.55	0.05	0.46	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01	0.25	2.46	0.22	2.23	0.01	0.06	0.00	0.03	0.25	2.50	0.23	2.26

b) PIA: Blue Creek

	Upper Blue Creek								Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.04	0.00	0.03	N/A	N/A	N/A	N/A	0.00	0.05	0.00	0.04	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.01	0.14	0.72	0.13	0.65	0.03	0.14	0.00	0.01	0.31	1.55	0.26	1.30
Barium	0.00	0.05	0.00	0.02	3.06	30.6	2.79	27.9	0.04	0.44	0.00	0.05	1.69	16.9	1.51	15.1
Beryllium	0.00	0.00	0.00	0.00	0.03	0.27	0.02	0.25	0.00	0.01	0.00	0.00	0.26	2.62	0.24	2.38
Cadmium	0.00	0.02	0.00	0.00	0.05	0.45	0.04	0.40	0.01	0.14	0.00	0.01	1.90	19.0	1.72	17.2
Cobalt	0.00	0.01	0.00	0.00	0.09	0.36	0.08	0.32	0.02	0.09	0.00	0.01	0.21	0.86	0.18	0.70
Copper	0.00	0.00	0.00	0.00	0.30	0.44	0.28	0.40	0.00	0.00	0.00	0.00	0.34	0.50	0.31	0.46
Manganese	0.09	0.31	0.01	0.03	4.57	14.7	4.08	13.2	0.80	2.60	0.06	0.19	49.6	160	44.5	144
Nickel	0.00	0.00	0.00	0.00	0.07	0.14	0.07	0.12	0.04	0.07	0.00	0.01	1.16	2.11	1.02	1.87
Selenium	0.03	0.28	0.03	0.26	0.43	4.32	0.39	3.94	0.02	0.21	0.04	0.36	0.69	6.94	0.65	6.49
Silver	0.00	0.00	0.00	0.00	0.02	0.25	0.02	0.23	0.00	0.01	0.00	0.00	0.06	0.63	0.06	0.57
Uranium	0.01	0.15	0.01	0.07	1.59	15.9	1.44	14.4	0.03	0.34	0.01	0.11	7.35	73.5	6.68	66.8
Vanadium	0.02	0.15	0.01	0.14	N/A	N/A	N/A	N/A	0.04	0.42	0.02	0.20	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	0.07	0.68	0.06	0.62	0.01	0.08	0.00	0.01	0.52	5.17	0.46	4.64

	Lower Blue Creek								FDR Lake							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.05	0.00	0.04	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.03	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.02	0.28	1.43	0.26	1.30	0.00	0.02	0.00	0.02	0.28	1.43	0.26	1.31
Barium	0.01	0.09	0.00	0.05	1.66	16.6	1.51	15.1	0.01	0.05	0.00	0.05	1.66	16.6	1.51	15.1
Beryllium	0.00	0.01	0.00	0.00	0.26	2.61	0.24	2.38	0.00	0.00	0.00	0.00	0.26	2.61	0.24	2.38
Cadmium	0.00	0.02	0.00	0.01	1.89	18.9	1.72	17.2	0.00	0.00	0.00	0.00	1.89	18.9	1.72	17.2
Cobalt	0.00	0.01	0.00	0.01	0.19	0.77	0.17	0.70	0.00	0.00	0.00	0.00	0.19	0.77	0.17	0.70
Copper	0.00	0.00	0.00	0.00	0.34	0.50	0.31	0.46	0.00	0.00	0.00	0.00	0.34	0.50	0.31	0.46
Manganese	0.05	0.15	0.02	0.05	48.8	158	44.4	143	0.00	0.01	0.00	0.01	48.8	157	44.4	143
Nickel	0.00	0.01	0.00	0.00	1.12	2.05	1.02	1.86	0.00	0.00	0.00	0.00	1.12	2.04	1.02	1.86
Selenium	0.01	0.08	0.01	0.07	0.68	6.81	0.62	6.20	0.01	0.07	0.01	0.07	0.68	6.81	0.62	6.20
Silver	0.00	0.00	0.00	0.00	0.06	0.63	0.06	0.57	0.00	0.00	0.00	0.00	0.06	0.63	0.06	0.57
Uranium	0.02	0.20	0.01	0.10	7.34	73.4	6.68	66.8	0.00	0.02	0.00	0.02	7.32	73.2	6.67	66.7
Vanadium	0.04	0.38	0.03	0.29	N/A	N/A	N/A	N/A	0.04	0.41	0.04	0.37	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01	0.51	5.11	0.46	4.64	0.00	0.02	0.00	0.02	0.51	5.11	0.47	4.66

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QG. Summary of Hazard Quotient Calculations
Receptor: Raccoon (Omnivorous Mammal)
Instream Sediments
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Pit 3							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.08	0.00	0.01				
Arsenic	0.04	0.19	0.00	0.01				
Barium	0.07	0.66	0.00	0.04				
Beryllium	0.01	0.08	0.00	0.01				
Cadmium	0.00	0.03	0.00	0.02				
Cobalt	0.03	0.10	0.01	0.02				
Copper	0.02	0.03	0.00	0.00				
Manganese	0.07	0.24	0.03	0.10				
Nickel	0.02	0.03	0.00	0.01				
Selenium	0.04	0.39	0.01	0.07				
Silver	0.00	0.03	0.00	0.01				
Uranium	**1.63**	**16.3**	0.38	**3.82**				
Vanadium	0.13	**1.28**	0.01	0.10				
Zinc	0.01	0.11	0.00	0.02				

	Pit 4							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01				
Arsenic	0.02	0.09	0.00	0.01				
Barium	0.02	0.17	0.00	0.01				
Beryllium	0.00	0.04	0.00	0.00				
Cadmium	0.00	0.00	0.00	0.00				
Cobalt	0.01	0.03	0.00	0.00				
Copper	0.00	0.01	0.00	0.00				
Manganese	0.04	0.14	0.00	0.01				
Nickel	0.01	0.01	0.00	0.00				
Selenium	0.01	0.13	0.00	0.02				
Silver	0.00	0.01	0.00	0.00				
Uranium	**1.06**	**10.6**	0.10	**1.03**				
Vanadium	0.14	**1.43**	0.01	0.10				
Zinc	0.00	0.02	0.00	0.00				

	Pollution Control Pond							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01				
Arsenic	0.02	0.09	0.00	0.01				
Barium	0.09	0.88	0.01	0.05				
Beryllium	0.03	0.32	0.00	0.02				
Cadmium	0.03	0.34	0.00	0.03				
Cobalt	0.06	0.24	0.01	0.03				
Copper	0.14	0.20	0.01	0.01				
Manganese	0.15	0.50	0.03	0.11				
Nickel	0.12	0.22	0.01	0.02				
Selenium	0.04	0.39	0.00	0.04				
Silver	0.00	0.01	0.00	0.00				
Uranium	**8.06**	**80.6**	0.71	**7.13**				
Vanadium	0.05	0.50	0.00	0.03				
Zinc	0.03	0.31	0.00	0.03				

	Blood Pool							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.02	0.17	0.00	0.02				
Arsenic	0.05	0.26	0.00	0.02				
Barium	0.02	0.17	0.00	0.02				
Beryllium	0.00	0.02	0.00	0.00				
Cadmium	0.00	0.01	0.00	0.00				
Cobalt	0.01	0.03	0.00	0.01				
Copper	0.02	0.03	0.00	0.00				
Manganese	0.02	0.07	0.01	0.03				
Nickel	0.01	0.01	0.00	0.00				
Selenium	0.02	0.24	0.00	0.04				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.28	**2.84**	0.10	0.96				
Vanadium	0.21	**2.05**	0.02	0.20				
Zinc	0.00	0.03	0.00	0.01				

	Outfall							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.02	0.19	0.00	0.02				
Arsenic	0.06	0.28	0.01	0.03				
Barium	0.01	0.14	0.00	0.02				
Beryllium	0.00	0.01	0.00	0.00				
Cadmium	0.00	0.02	0.00	0.00				
Cobalt	0.01	0.03	0.00	0.00				
Copper	0.01	0.02	0.00	0.00				
Manganese	0.08	0.24	0.01	0.03				
Nickel	0.01	0.01	0.00	0.00				
Selenium	0.02	0.17	0.00	0.02				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.53	**5.32**	0.06	0.60				
Vanadium	0.10	**1.02**	0.01	0.11				
Zinc	0.00	0.04	0.00	0.00				

b) PIA: Western, Central, and Eastern Drainages

	Western Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.00	0.02	0.12	0.01	0.04
Barium	0.01	0.10	0.00	0.01	0.07	0.66	0.02	0.19
Beryllium	0.00	0.04	0.00	0.00	0.08	0.84	0.03	0.26
Cadmium	0.00	0.03	0.00	0.00	0.05	0.49	0.02	0.15
Cobalt	0.00	0.01	0.00	0.00	0.06	0.23	0.02	0.07
Copper	0.00	0.01	0.00	0.00	0.11	0.16	0.03	0.05
Manganese	0.08	0.26	0.01	0.02	**2.59**	**8.38**	0.82	**2.66**
Nickel	0.01	0.01	0.00	0.00	0.07	0.13	0.02	0.04
Selenium	0.10	**1.04**	0.01	0.08	0.21	**2.09**	0.04	0.42
Silver	0.00	0.01	0.00	0.00	0.06	0.59	0.02	0.19
Uranium	0.38	**3.83**	0.02	0.22	**9.55**	**95.5**	**3.00**	**30.0**
Vanadium	0.04	0.40	0.00	0.04	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.04	0.42	0.01	0.13

	Central Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.06	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.04	0.00	0.00	0.03	0.14	0.01	0.06
Barium	0.02	0.15	0.00	0.01	0.07	0.72	0.11	**1.14**
Beryllium	0.00	0.04	0.00	0.00	0.08	0.84	0.03	0.26
Cadmium	0.01	0.10	0.00	0.02	0.06	0.56	0.08	0.79
Cobalt	0.03	0.13	0.00	0.01	0.09	0.34	0.02	0.08
Copper	0.01	0.01	0.00	0.00	0.11	0.16	0.03	0.05
Manganese	0.15	0.47	0.03	0.10	**2.66**	**8.58**	**1.85**	**5.97**
Nickel	0.04	0.07	0.00	0.01	0.11	0.19	0.05	0.09
Selenium	0.14	**1.35**	0.01	0.08	0.24	**2.40**	0.05	0.52
Silver	0.00	0.01	0.00	0.00	0.06	0.60	0.02	0.19
Uranium	**4.75**	**47.5**	0.28	**2.77**	**13.9**	**139**	**3.26**	**32.6**
Vanadium	0.09	0.87	0.00	0.05	N/A	N/A	N/A	N/A
Zinc	0.02	0.18	0.00	0.02	0.06	0.58	0.03	0.27

	Upper Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.08	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.06	0.00	0.00	0.04	0.18	0.01	0.04
Barium	0.02	0.17	0.00	0.01	0.09	0.94	0.03	0.26
Beryllium	0.00	0.01	0.00	0.00	0.02	0.22	0.01	0.07
Cadmium	0.00	0.02	0.00	0.00	0.16	**1.55**	0.05	0.50
Cobalt	0.01	0.03	0.00	0.00	0.04	0.16	0.01	0.04
Copper	0.01	0.01	0.00	0.00	0.05	0.07	0.01	0.02
Manganese	0.06	0.19	0.00	0.01	**1.47**	**4.73**	0.46	**1.49**
Nickel	0.01	0.01	0.00	0.00	0.08	0.14	0.02	0.04
Selenium	0.01	0.13	0.00	0.02	0.82	**8.21**	0.26	**2.64**
Silver	0.00	0.02	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.10	**1.04**	0.01	0.05	**1.13**	**11.3**	0.34	**3.39**
Vanadium	0.11	**1.10**	0.01	0.08	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.04	0.45	0.01	0.14

	Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.13	0.00	0.02	N/A	N/A	N/A	N/A
Arsenic	0.01	0.05	0.00	0.00	0.03	0.17	0.01	0.04
Barium	0.03	0.33	0.00	0.03	0.11	**1.09**	0.03	0.28
Beryllium	0.00	0.04	0.00	0.00	0.02	0.25	0.01	0.07
Cadmium	0.03	0.27	0.00	0.02	0.18	**1.81**	0.05	0.52
Cobalt	0.01	0.05	0.00	0.00	0.04	0.17	0.01	0.04
Copper	0.01	0.01	0.00	0.00	0.05	0.07	0.01	0.02
Manganese	0.59	**1.91**	0.04	0.14	**2.00**	**6.45**	0.50	**1.62**
Nickel	0.05	0.09	0.00	0.01	0.12	0.22	0.03	0.05
Selenium	0.42	**4.16**	0.03	0.26	**1.22**	**12.2**	0.29	**2.89**
Silver	0.00	0.01	0.00	0.00	0.01	0.09	0.00	0.03
Uranium	0.11	**1.10**	0.01	0.08	**1.14**	**11.4**	0.34	**3.42**
Vanadium	0.10	**1.05**	0.01	0.11	N/A	N/A	N/A	N/A
Zinc	0.01	0.11	0.00	0.01	0.05	0.53	0.01	0.14

c). PIA: Blue Creek

	Upper Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.00	0.02	0.12	0.01	0.03
Barium	0.01	0.09	0.00	0.01	0.43	**4.26**	0.14	**1.36**
Beryllium	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.01
Cadmium	0.00	0.03	0.00	0.00	0.01	0.14	0.00	0.04
Cobalt	0.00	0.02	0.00	0.00	0.02	0.07	0.00	0.02
Copper	0.00	0.00	0.00	0.00	0.06	0.09	0.02	0.03
Manganese	0.18	0.59	0.00	0.01	0.76	**2.46**	0.19	0.62
Nickel	0.00	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Selenium	0.05	0.53	0.01	0.06	0.14	**1.38**	0.03	0.34
Silver	0.00	0.00	0.00	0.00	0.01	0.07	0.00	0.02
Uranium	0.03	0.27	0.00	0.02	0.25	**2.49**	0.07	0.74
Vanadium	0.03	0.29	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	0.03	0.29	0.01	0.09

	Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.05	0.27	0.00	0.00	0.09	0.46	0.01	0.06
Barium	0.08	0.85	0.00	0.01	0.29	**2.90**	0.07	0.68
Beryllium	0.00	0.03	0.00	0.00	0.04	0.36	0.01	0.11
Cadmium	0.03	0.27	0.00	0.00	0.27	**2.66**	0.08	0.78
Cobalt	0.05	0.18	0.00	0.00	0.07	0.28	0.01	0.03
Copper	0.00	0.01	0.00	0.00	0.06	0.08	0.02	0.03
Manganese	**1.54**	**4.96**	0.01	0.04	**7.44**	**24.0**	**1.93**	**6.24**
Nickel	0.07	0.13	0.00	0.00	0.21	0.38	0.05	0.08
Selenium	0.04	0.38	0.01	0.09	0.15	**1.53**	0.05	0.47
Silver	0.00	0.01	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.06	0.63	0.00	0.03	**1.04**	**10.4**	0.32	**3.21**
Vanadium	0.08	0.80	0.00	0.05	N/A	N/A	N/A	N/A
Zinc	0.02	0.15	0.00	0.00	0.09	0.91	0.02	0.25

	Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.08	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.04	0.00	0.00	0.04	0.23	0.01	0.06
Barium	0.02	0.18	0.00	0.01	0.22	**2.23**	0.07	0.68
Beryllium	0.00	0.01	0.00	0.00	0.03	0.34	0.01	0.11
Cadmium	0.00	0.03	0.00	0.00	0.24	**2.41**	0.08	0.78
Cobalt	0.01	0.02	0.00	0.00	0.03	0.12	0.01	0.03
Copper	0.00	0.00	0.00	0.00	0.06	0.08	0.02	0.03
Manganese	0.09	0.29	0.00	0.01	**5.99**	**19.3**	**1.92**	**6.21**
Nickel	0.01	0.01	0.00	0.00	0.15	0.27	0.05	0.08
Selenium	0.01	0.14	0.00	0.02	0.13	**1.30**	0.04	0.39
Silver	0.00	0.01	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.04	0.38	0.00	0.03	**1.02**	**10.2**	0.32	**3.21**
Vanadium	0.07	0.72	0.01	0.07	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.08	0.80	0.02	0.25

	FDR Lake							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.04	0.00	0.00	0.05	0.23	0.01	0.07
Barium	0.01	0.10	0.00	0.01	0.22	**2.16**	0.07	0.68
Beryllium	0.00	0.00	0.00	0.00	0.03	0.33	0.01	0.11
Cadmium	0.00	0.00	0.00	0.00	0.24	**2.39**	0.08	0.78
Cobalt	0.00	0.01	0.00	0.00	0.03	0.11	0.01	0.03
Copper	0.00	0.00	0.00	0.00	0.05	0.08	0.02	0.03
Manganese	0.01	0.02	0.00	0.00	**5.91**	**19.1**	**1.92**	**6.20**
Nickel	0.00	0.00	0.00	0.00	0.14	0.25	0.05	0.08
Selenium	0.01	0.13	0.00	0.02	0.13	**1.28**	0.04	0.40
Silver	0.00	0.01	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.00	0.03	0.00	0.00	0.98	**9.83**	0.32	**3.19**
Vanadium	0.08	0.78	0.01	0.09	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.01	0.08	0.81	0.03	0.25

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table QM. Summary of Hazard Quotient Calculations
Receptor: American Robin (Soil Invertebrate Feeding Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.14	0.55	0.01	0.03	1.24	4.95	0.06	0.25	0.14	0.55	0.01	0.03	1.24	4.95	0.06	0.25
Cadmium	0.02	0.07	0.00	0.01	22.2	88.8	1.18	4.71	0.02	0.07	0.00	0.01	22.2	88.8	1.18	4.71
Chromium	0.17	0.87	0.03	0.16	17.3	86.3	3.08	15.4	0.17	0.87	0.03	0.16	17.3	86.3	3.08	15.4
Cobalt	0.01	0.02	0.01	0.01	0.03	0.05	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.05	0.01	0.02
Copper	0.03	0.04	0.01	0.01	1.59	1.96	0.35	0.43	0.03	0.04	0.01	0.01	1.59	1.96	0.35	0.43
Lead	0.07	0.74	0.01	0.10	145	1450	19.7	197	0.07	0.74	0.01	0.10	145	1450	19.7	197
Manganese	0.01	0.09	0.00	0.02	0.02	0.23	0.00	0.04	0.01	0.09	0.00	0.02	0.02	0.23	0.00	0.04
Molybdenum	0.01	0.12	0.00	0.03	0.22	2.25	0.05	0.51	0.01	0.12	0.00	0.03	0.22	2.25	0.05	0.51
Nickel	0.01	0.02	0.00	0.01	0.50	0.70	0.13	0.18	0.01	0.02	0.00	0.01	0.51	0.70	0.13	0.18
Selenium	1.49	2.99	0.05	0.10	177	353	5.60	11.2	1.49	2.99	0.05	0.10	177	353	5.60	11.2
Thallium	0.03	0.27	0.00	0.03	0.26	2.64	0.03	0.28	0.03	0.27	0.00	0.03	0.26	2.64	0.03	0.28
Uranium	0.01	0.06	0.00	0.02	0.01	0.08	0.00	0.02	0.01	0.07	0.00	0.02	0.01	0.09	0.00	0.02
Vanadium	0.02	0.15	0.00	0.02	0.03	0.27	0.00	0.04	0.02	0.15	0.00	0.02	0.03	0.27	0.00	0.04
Zinc	0.03	0.56	0.00	0.09	9.60	204	0.94	19.9	0.03	0.57	0.00	0.10	9.60	204	0.94	19.9

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.03	0.12	0.00	0.01	0.26	1.05	0.01	0.06	0.00	0.01	0.00	0.01	0.03	0.11	0.01	0.06
Cadmium	0.00	0.01	0.00	0.00	5.07	20.3	1.54	6.15	0.00	0.02	0.00	0.01	2.28	9.14	0.86	3.43
Chromium	0.08	0.39	0.03	0.16	7.61	38.1	3.12	15.6	0.04	0.18	0.02	0.09	3.64	18.2	1.85	9.24
Cobalt	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.02	0.01	0.01
Copper	0.01	0.02	0.00	0.01	0.62	0.76	0.24	0.30	0.01	0.01	0.00	0.00	0.30	0.36	0.17	0.21
Lead	0.02	0.24	0.01	0.10	46.8	468	18.7	187	0.01	0.14	0.01	0.08	27.8	277.93	16.5	165.40
Manganese	0.00	0.03	0.00	0.01	0.01	0.08	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.03
Molybdenum	0.00	0.01	0.00	0.00	0.01	0.11	0.00	0.04	0.00	0.01	0.00	0.00	0.01	0.13	0.00	0.04
Nickel	0.00	0.01	0.00	0.00	0.25	0.34	0.11	0.15	0.00	0.01	0.00	0.00	0.14	0.20	0.07	0.10
Selenium	0.00	0.00	0.00	0.00	0.17	0.33	0.12	0.24	0.01	0.03	0.00	0.00	1.49	2.98	0.27	0.54
Thallium	0.00	0.02	0.00	0.01	0.02	0.21	0.01	0.11	0.00	0.02	0.00	0.01	0.02	0.18	0.01	0.10
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.06	0.00	0.03	0.01	0.10	0.00	0.04	0.00	0.03	0.00	0.02	0.01	0.06	0.00	0.03
Zinc	0.01	0.15	0.00	0.05	2.92	62.2	0.92	19.5	0.01	0.12	0.00	0.05	1.46	31.2	0.76	16.1

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.05	0.21	0.01	0.03	0.48	1.91	0.06	0.24	0.02	0.07	0.00	0.02	0.16	0.62	0.04	0.17
Cadmium	0.00	0.01	0.00	0.00	5.45	21.8	1.72	6.89	0.00	0.01	0.00	0.00	4.56	18.3	1.37	5.48
Chromium	0.06	0.28	0.02	0.12	5.54	27.7	2.39	12.0	0.04	0.19	0.02	0.10	3.66	18.3	1.95	9.74
Cobalt	0.01	0.01	0.00	0.00	0.02	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01
Copper	0.02	0.03	0.01	0.01	1.12	1.38	0.27	0.34	0.02	0.03	0.01	0.01	1.00	1.23	0.29	0.36
Lead	0.03	0.25	0.01	0.09	49.9	499	16.8	168	0.01	0.14	0.01	0.09	28.1	281	17.5	175
Manganese	0.00	0.02	0.00	0.01	0.00	0.05	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.05	0.00	0.02
Molybdenum	0.00	0.02	0.00	0.01	0.04	0.35	0.01	0.10	0.00	0.03	0.00	0.01	0.05	0.52	0.01	0.13
Nickel	0.01	0.01	0.00	0.00	0.33	0.45	0.10	0.14	0.00	0.00	0.00	0.00	0.13	0.19	0.07	0.10
Selenium	0.00	0.00	0.00	0.00	0.19	0.37	0.13	0.27	0.00	0.00	0.00	0.00	0.17	0.33	0.12	0.24
Thallium	0.00	0.03	0.00	0.01	0.03	0.27	0.01	0.13	0.01	0.05	0.00	0.02	0.05	0.52	0.02	0.18
Uranium	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.00	0.05	0.00	0.02	0.01	0.08	0.00	0.04	0.00	0.03	0.00	0.02	0.01	0.06	0.00	0.03
Zinc	0.01	0.12	0.00	0.05	2.27	48.4	0.94	20.0	0.01	0.11	0.00	0.05	2.04	43.4	1.00	21.2

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table QN 1. Summary of Hazard Quotient Calculations
Receptor: Wilson's Snipe (Soil Invertebrate Feeding Bird)
Instream Sediments
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Pit 3							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.28	1.13	0.06	0.24				
Barium	0.15	0.29	0.03	0.06				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.03	0.00	0.01				
Cobalt	0.17	0.32	0.05	0.10				
Copper	0.36	0.45	0.10	0.12				
Manganese	0.02	0.18	0.01	0.07				
Nickel	0.14	0.19	0.04	0.06				
Selenium	0.10	0.20	0.04	0.07				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.07	0.70	0.02	0.20				
Vanadium	0.04	0.43	0.01	0.12				
Zinc	0.17	3.62	0.06	1.34				

	Pit 4							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.13	0.53	0.03	0.14				
Barium	0.04	0.07	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.02	0.00	0.01				
Cobalt	0.06	0.12	0.02	0.04				
Copper	0.10	0.12	0.03	0.03				
Manganese	0.02	0.22	0.01	0.05				
Nickel	0.06	0.08	0.02	0.02				
Selenium	0.07	0.14	0.03	0.06				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.06	0.57	0.01	0.12				
Vanadium	0.05	0.48	0.01	0.12				
Zinc	0.04	0.90	0.01	0.28				

	Pollution Control Pond							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.14	0.55	0.03	0.13				
Barium	0.20	0.39	0.04	0.08				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.39	1.57	0.08	0.32				
Cobalt	0.45	0.86	0.10	0.18				
Copper	2.67	3.30	0.55	0.68				
Manganese	0.05	0.54	0.01	0.13				
Nickel	1.14	1.57	0.23	0.32				
Selenium	0.09	0.17	0.03	0.06				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.43	4.29	0.09	0.86				
Vanadium	0.02	0.17	0.00	0.03				
Zinc	0.53	11.28	0.11	2.39				

	Blood Pool							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.39	1.55	0.13	0.51				
Barium	0.04	0.07	0.01	0.03				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.02	0.00	0.01				
Cobalt	0.03	0.06	0.01	0.02				
Copper	0.32	0.39	0.11	0.14				
Manganese	0.00	0.05	0.00	0.02				
Nickel	0.05	0.06	0.02	0.02				
Selenium	0.09	0.17	0.03	0.07				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.01	0.08	0.00	0.03				
Vanadium	0.07	0.69	0.02	0.24				
Zinc	0.04	0.86	0.02	0.33				

	Outfall							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.43	1.70	0.17	0.67				
Barium	0.03	0.06	0.01	0.03				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.10	0.01	0.04				
Cobalt	0.06	0.12	0.02	0.05				
Copper	0.20	0.25	0.08	0.10				
Manganese	N/A	N/A	0.01	0.15				
Nickel	0.04	0.37	0.02	0.03				
Selenium	0.06	0.08	0.04	0.07				
Silver	0.10	0.19	0.00	0.00				
Uranium	0.00	0.01	0.01	0.12				
Vanadium	0.03	0.30	0.01	0.13				
Zinc	0.03	0.34	0.03	0.63				

b) PIA: Western, Central, and Eastern Drainages

	Western Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.03	0.12	0.01	0.03				
Barium	0.02	0.04	0.01	0.01				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.14	0.01	0.03				
Cobalt	0.03	0.06	0.01	0.02				
Copper	0.07	0.09	0.02	0.03				
Manganese	0.04	0.38	0.01	0.06				
Nickel	0.04	0.06	0.01	0.01				
Selenium	0.59	1.18	0.15	0.30				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.02	0.22	0.00	0.04				
Vanadium	0.01	0.13	0.00	0.04				
Zinc	0.05	1.05	0.01	0.24				

	Central Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.06	0.24	0.02	0.08				
Barium	0.03	0.07	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.10	0.40	0.03	0.13				
Cobalt	0.27	0.51	0.06	0.12				
Copper	0.10	0.13	0.04	0.05				
Manganese	0.06	0.58	0.02	0.15				
Nickel	0.35	0.48	0.09	0.13				
Selenium	0.77	1.54	0.16	0.33				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.27	2.69	0.06	0.55				
Vanadium	0.03	0.29	0.01	0.06				
Zinc	0.32	6.77	0.08	1.60				

	Upper Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.09	0.37	0.01	0.05				
Barium	0.04	0.08	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.02	0.10	0.01	0.02				
Cobalt	0.06	0.12	0.01	0.02				
Copper	0.11	0.13	0.02	0.02				
Manganese	0.03	0.27	0.01	0.05				
Nickel	0.05	0.07	0.01	0.01				
Selenium	0.07	0.15	0.03	0.06				
Silver	0.00	0.02	0.00	0.00				
Uranium	0.01	0.06	0.00	0.01				
Vanadium	0.04	0.37	0.01	0.10				
Zinc	0.05	1.10	0.01	0.23				

	Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.08	0.30	0.02	0.08				
Barium	0.07	0.14	0.02	0.04				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.33	1.33	0.08	0.34				
Cobalt	0.10	0.18	0.02	0.05				
Copper	0.11	0.13	0.02	0.03				
Manganese	0.29	2.94	0.08	0.78				
Nickel	0.46	0.64	0.11	0.15				
Selenium	2.36	4.73	0.53	1.05				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.01	0.06	0.00	0.02				
Vanadium	0.04	0.35	0.01	0.13				
Zinc	0.21	4.45	0.05	1.06				

c). PIA: Blue Creek

	Upper Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.03	0.12	0.01	0.03				
Barium	0.02	0.04	0.00	0.01				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.14	0.00	0.01				
Cobalt	0.04	0.08	0.00	0.01				
Copper	0.01	0.02	0.00	0.00				
Manganese	0.09	0.90	0.00	0.04				
Nickel	0.05	0.07	0.00	0.00				
Selenium	0.30	0.59	0.12	0.23				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.00	0.01	0.00	0.00				
Vanadium	0.01	0.10	0.00	0.04				
Zinc	0.02	0.46	0.00	0.08				

	Middle Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.41	1.66	0.02	0.07				
Barium	0.19	0.38	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.33	1.33	0.01	0.06				
Cobalt	0.37	0.71	0.01	0.02				
Copper	0.07	0.09	0.01	0.01				
Manganese	0.77	7.65	0.02	0.24				
Nickel	0.69	0.95	0.03	0.04				
Selenium	0.21	0.42	0.16	0.32				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.00	0.03	0.00	0.00				
Vanadium	0.03	0.27	0.01	0.06				
Zinc	0.27	5.85	0.01	0.31				

	Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.06	0.25	0.02	0.08				
Barium	0.04	0.08	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.14	0.00	0.02				
Cobalt	0.04	0.08	0.01	0.02				
Copper	0.06	0.07	0.02	0.02				
Manganese	0.04	0.44	0.01	0.06				
Nickel	0.08	0.11	0.01	0.02				
Selenium	0.08	0.16	0.03	0.06				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.00	0.02	0.00	0.00				
Vanadium	0.02	0.24	0.01	0.08				
Zinc	0.06	1.33	0.01	0.30				

	FDR Lake							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.07	0.27	0.03	0.10				
Barium	0.02	0.05	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.02	0.00	0.01				
Cobalt	0.02	0.04	0.01	0.01				
Copper	0.04	0.05	0.02	0.02				
Manganese	0.00	0.03	0.00	0.01				
Nickel	0.02	0.02	0.01	0.01				
Selenium	0.07	0.14	0.03	0.06				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.00	0.00	0.00	0.00				
Vanadium	0.03	0.26	0.01	0.10				
Zinc	0.08	1.73	0.03	0.68				

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table QL. Summary of Hazard Quotient Calculations
Receptor: Song Sparrow (Omnivorous Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.17	0.67	0.01	0.04	0.22	0.86	0.05	0.19	0.17	0.67	0.01	0.04	0.22	0.86	0.05	0.19
Cadmium	0.02	0.09	0.00	0.01	0.19	0.77	0.14	0.57	0.02	0.09	0.00	0.01	0.19	0.77	0.14	0.57
Chromium	0.21	**1.06**	0.04	0.20	0.25	**1.26**	0.07	0.35	0.21	**1.06**	0.04	0.20	0.25	**1.25**	0.07	0.35
Cobalt	0.01	0.03	0.01	0.01	0.02	0.03	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.03	0.01	0.02
Copper	0.04	0.05	0.01	0.01	0.08	0.10	0.04	0.06	0.04	0.05	0.01	0.01	0.08	0.10	0.04	0.06
Lead	0.09	0.90	0.01	0.13	0.10	0.99	0.02	0.20	0.09	0.90	0.01	0.13	0.10	0.99	0.02	0.20
Manganese	0.01	0.12	0.00	0.03	0.03	0.29	0.02	0.17	0.01	0.12	0.00	0.03	0.03	0.29	0.02	0.17
Molybdenum	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A
Nickel	0.02	0.02	0.01	0.01	0.03	0.05	0.02	0.03	0.02	0.02	0.01	0.01	0.04	0.05	0.02	0.03
Selenium	**1.82**	**3.64**	0.06	0.13	**1.83**	**3.67**	0.08	0.15	**1.82**	**3.64**	0.06	0.12	**1.84**	**3.67**	0.07	0.15
Thallium	0.03	0.33	0.00	0.04	0.04	0.45	0.01	0.13	0.03	0.33	0.00	0.04	0.04	0.45	0.01	0.13
Uranium	0.01	0.09	0.00	0.03	0.01	0.10	0.00	0.03	0.01	0.10	0.00	0.03	0.01	0.10	0.00	0.04
Vanadium	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.03	0.72	0.01	0.13	0.08	**1.77**	0.05	0.99	0.03	0.73	0.01	0.13	0.08	**1.78**	0.05	0.99

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.14	0.00	0.01	0.08	0.34	0.04	0.17	0.00	0.02	0.00	0.01	0.05	0.21	0.04	0.17
Cadmium	0.00	0.02	0.00	0.00	0.17	0.70	0.14	0.56	0.01	0.02	0.00	0.01	0.18	0.70	0.14	0.57
Chromium	0.09	0.47	0.04	0.20	0.13	0.66	0.07	0.35	0.04	0.22	0.02	0.12	0.08	0.42	0.06	0.28
Cobalt	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Copper	0.02	0.02	0.01	0.01	0.06	0.07	0.04	0.05	0.01	0.01	0.00	0.01	0.05	0.06	0.04	0.05
Lead	0.03	0.29	0.01	0.12	0.04	0.38	0.02	0.19	0.02	0.17	0.01	0.11	0.03	0.26	0.02	0.18
Manganese	0.00	0.04	0.00	0.01	0.02	0.21	0.02	0.15	0.00	0.03	0.00	0.02	0.02	0.21	0.02	0.16
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.02	0.02	0.01	0.01	0.00	0.01	0.02	0.03	0.02	0.03
Selenium	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.03	0.02	0.03	0.00	0.01	0.03	0.07	0.02	0.03
Thallium	0.00	0.03	0.00	0.02	0.01	0.14	0.01	0.11	0.00	0.02	0.00	0.01	0.01	0.14	0.01	0.11
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Vanadium	0.01	0.07	0.00	0.03	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.19	0.00	0.06	0.06	**1.23**	0.04	0.92	0.01	0.16	0.00	0.07	0.06	**1.21**	0.04	0.93

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.26	0.01	0.03	0.11	0.45	0.05	0.19	0.02	0.08	0.01	0.02	0.07	0.28	0.05	0.18
Cadmium	0.00	0.02	0.00	0.01	0.17	0.70	0.14	0.56	0.00	0.02	0.00	0.00	0.17	0.70	0.14	0.56
Chromium	0.07	0.34	0.03	0.15	0.11	0.54	0.06	0.31	0.05	0.23	0.02	0.12	0.08	0.42	0.06	0.28
Cobalt	0.01	0.01	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
Copper	0.03	0.04	0.01	0.01	0.07	0.09	0.04	0.05	0.03	0.03	0.01	0.01	0.07	0.08	0.04	0.05
Lead	0.03	0.31	0.01	0.11	0.04	0.40	0.02	0.18	0.02	0.17	0.01	0.11	0.03	0.27	0.02	0.19
Manganese	0.00	0.02	0.00	0.01	0.02	0.20	0.01	0.15	0.00	0.02	0.00	0.01	0.02	0.19	0.02	0.15
Molybdenum	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.02	0.02	0.00	0.01	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.03	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.03
Thallium	0.00	0.04	0.00	0.02	0.02	0.15	0.01	0.11	0.01	0.07	0.00	0.02	0.02	0.18	0.01	0.12
Uranium	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.01	0.06	0.00	0.03	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.15	0.00	0.06	0.06	**1.20**	0.04	0.92	0.01	0.14	0.00	0.07	0.06	**1.18**	0.04	0.93

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table QT. Summary of Hazard Quotient Calculations
Receptor: Song Sparrow (Herbivorous Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.17	0.67	0.01	0.04	0.21	0.83	0.04	0.16	0.17	0.67	0.01	0.04	0.21	0.83	0.04	0.16
Cadmium	0.02	0.09	0.00	0.01	0.17	0.66	0.12	0.49	0.02	0.09	0.00	0.01	0.17	0.66	0.12	0.49
Chromium	0.21	**1.06**	0.04	0.20	0.28	**1.42**	0.10	0.49	0.21	**1.06**	0.04	0.20	0.28	**1.42**	0.10	0.49
Cobalt	0.01	0.03	0.01	0.01	0.02	0.03	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.04	0.01	0.02
Copper	0.04	0.05	0.01	0.01	0.30	0.37	0.22	0.27	0.04	0.05	0.01	0.01	0.30	0.37	0.22	0.27
Lead	0.09	0.90	0.01	0.13	0.12	**1.21**	0.04	0.38	0.09	0.90	0.01	0.13	0.12	**1.21**	0.04	0.38
Manganese	0.01	0.12	0.00	0.03	0.02	0.23	0.01	0.12	0.01	0.12	0.00	0.03	0.02	0.24	0.01	0.12
Molybdenum	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A
Nickel	0.02	0.02	0.01	0.01	0.03	0.04	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.04	0.02	0.02
Selenium	**1.82**	**3.64**	0.06	0.13	**1.87**	**3.74**	0.10	0.21	**1.82**	**3.64**	0.06	0.12	**1.87**	**3.74**	0.10	0.21
Thallium	0.03	0.33	0.00	0.04	0.05	0.49	0.02	0.17	0.03	0.33	0.00	0.04	0.05	0.49	0.02	0.17
Uranium	0.01	0.09	0.00	0.03	0.01	0.10	0.00	0.04	0.01	0.10	0.00	0.03	0.01	0.11	0.00	0.04
Vanadium	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.03	0.72	0.01	0.13	0.14	**2.94**	0.09	**1.95**	0.03	0.73	0.01	0.13	0.14	**2.95**	0.09	**1.95**

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.14	0.00	0.01	0.07	0.30	0.03	0.14	0.00	0.02	0.00	0.01	0.04	0.17	0.03	0.14
Cadmium	0.00	0.02	0.00	0.00	0.15	0.59	0.12	0.48	0.01	0.02	0.00	0.01	0.15	0.60	0.12	0.48
Chromium	0.09	0.47	0.04	0.20	0.17	0.83	0.10	0.49	0.04	0.22	0.02	0.12	0.12	0.58	0.08	0.41
Cobalt	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Copper	0.02	0.02	0.01	0.01	0.27	0.33	0.21	0.26	0.01	0.01	0.00	0.01	0.26	0.32	0.21	0.26
Lead	0.03	0.29	0.01	0.12	0.06	0.60	0.04	0.37	0.02	0.17	0.01	0.11	0.05	0.48	0.04	0.36
Manganese	0.00	0.04	0.00	0.01	0.02	0.15	0.01	0.10	0.00	0.03	0.00	0.02	0.02	0.15	0.01	0.12
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.05	0.11	0.04	0.09	0.02	0.03	0.00	0.01	0.07	0.13	0.05	0.09
Thallium	0.00	0.03	0.00	0.02	0.02	0.19	0.01	0.15	0.00	0.02	0.00	0.01	0.02	0.18	0.01	0.14
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Vanadium	0.01	0.07	0.00	0.03	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.19	0.00	0.06	0.11	**2.41**	0.09	**1.88**	0.01	0.16	0.00	0.07	0.11	**2.39**	0.09	**1.89**

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.26	0.01	0.03	0.10	0.42	0.04	0.16	0.02	0.08	0.01	0.02	0.06	0.24	0.04	0.15
Cadmium	0.00	0.02	0.00	0.01	0.15	0.59	0.12	0.48	0.00	0.02	0.00	0.00	0.15	0.59	0.12	0.48
Chromium	0.07	0.34	0.03	0.15	0.14	0.70	0.09	0.44	0.05	0.23	0.02	0.12	0.12	0.58	0.08	0.42
Cobalt	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Copper	0.03	0.04	0.01	0.01	0.28	0.35	0.22	0.27	0.03	0.03	0.01	0.01	0.28	0.35	0.22	0.27
Lead	0.03	0.31	0.01	0.11	0.06	0.62	0.04	0.36	0.02	0.17	0.01	0.11	0.05	0.49	0.04	0.37
Manganese	0.00	0.02	0.00	0.01	0.01	0.14	0.01	0.10	0.00	0.02	0.00	0.01	0.01	0.14	0.01	0.11
Molybdenum	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.01	0.02	0.00	0.01	0.00	0.00	0.02	0.02	0.01	0.02
Selenium	0.00	0.00	0.00	0.00	0.05	0.11	0.04	0.09	0.00	0.00	0.00	0.00	0.05	0.11	0.04	0.09
Thallium	0.00	0.04	0.00	0.02	0.02	0.20	0.02	0.15	0.01	0.07	0.00	0.02	0.02	0.23	0.02	0.16
Uranium	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.01
Vanadium	0.01	0.06	0.00	0.03	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.15	0.00	0.06	0.11	**2.37**	0.09	**1.88**	0.01	0.14	0.00	0.07	0.11	**2.36**	0.09	**1.89**

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QS. Summary of Hazard Quotient Calculations
Receptor: Spruce Grouse (Herbivorous Bird)
Mined Area, Soils
Midnite Mine Site
Wellpinit, WA

a). Mined Area

	Mined Area (Water Concentrations from Pit 3)								Mined Area (Water Concentrations from Pollution Control Pond)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	0.04	0.18	0.00	0.01	0.05	0.21	0.01	0.04	0.04	0.18	0.00	0.01	0.05	0.21	0.01	0.04
Cadmium	0.01	0.02	0.00	0.01	0.03	0.12	0.03	0.10	0.01	0.02	0.00	0.01	0.03	0.12	0.03	0.10
Chromium	0.06	0.28	0.01	0.07	0.06	0.31	0.02	0.10	0.06	0.28	0.01	0.07	0.06	0.31	0.02	0.10
Cobalt	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Copper	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01
Lead	0.02	0.24	0.00	0.04	0.03	0.25	0.01	0.06	0.02	0.24	0.00	0.04	0.03	0.25	0.01	0.06
Manganese	0.00	0.03	0.00	0.01	0.01	0.06	0.00	0.04	0.00	0.03	0.00	0.01	0.01	0.06	0.00	0.04
Molybdenum	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Selenium	0.48	0.96	0.02	0.04	0.48	0.96	0.02	0.05	0.48	0.96	0.02	0.04	0.48	0.96	0.02	0.05
Thallium	0.01	0.09	0.00	0.01	0.01	0.10	0.00	0.03	0.01	0.09	0.00	0.01	0.01	0.10	0.00	0.03
Uranium	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.00	0.05	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.01	0.19	0.00	0.05	0.02	0.35	0.01	0.20	0.01	0.20	0.00	0.05	0.02	0.35	0.01	0.20

b). PIA: Northeast, Southwest, East Haul Road, and West Haul Road

	Northeast								Southwest							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	0.01	0.04	0.00	0.00	0.02	0.07	0.01	0.03	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.03
Cadmium	0.00	0.00	0.00	0.00	0.03	0.11	0.03	0.10	0.00	0.01	0.00	0.00	0.03	0.11	0.03	0.10
Chromium	0.02	0.12	0.01	0.07	0.03	0.15	0.02	0.10	0.01	0.06	0.01	0.04	0.02	0.09	0.01	0.07
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Lead	0.01	0.08	0.00	0.04	0.01	0.09	0.01	0.06	0.00	0.05	0.00	0.04	0.01	0.06	0.01	0.05
Manganese	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.03
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Selenium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Thallium	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.00	0.05	0.00	0.02	0.01	0.21	0.01	0.17	0.00	0.05	0.00	0.02	0.01	0.20	0.01	0.18

	East Haul Road								West Haul Road							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	0.02	0.07	0.00	0.01	0.02	0.10	0.01	0.04	0.01	0.02	0.00	0.01	0.01	0.05	0.01	0.04
Cadmium	0.00	0.00	0.00	0.00	0.03	0.11	0.03	0.10	0.00	0.00	0.00	0.00	0.03	0.11	0.03	0.10
Chromium	0.02	0.09	0.01	0.05	0.02	0.12	0.02	0.08	0.01	0.06	0.01	0.04	0.02	0.09	0.01	0.07
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01
Lead	0.01	0.08	0.00	0.04	0.01	0.09	0.01	0.05	0.00	0.05	0.00	0.04	0.01	0.06	0.01	0.05
Manganese	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Thallium	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.03
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.02	0.01	0.19	0.01	0.17	0.00	0.04	0.00	0.02	0.01	0.19	0.01	0.18

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QN 2. Summary of Hazard Quotient Calculations
Receptor: Wilson's Snipe (Soil Invertebrate Feeding Bird)
Riparian Sediments
Midnite Mine Site
Wellpinit, WA

a) PIA: Western, Central, and Eastern Drainages

	Western Drainage								Central Drainage							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.05	0.19	0.01	0.04	0.05	0.20	0.01	0.05	0.20	0.78	0.04	0.17	0.20	0.80	0.05	0.18
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.07	0.00	0.01	0.22	0.86	0.15	0.60	0.15	0.61	0.03	0.13	0.35	**1.40**	0.18	0.73
Cobalt	0.05	0.09	0.01	0.01	0.05	0.10	0.01	0.02	0.31	0.58	0.06	0.11	0.31	0.59	0.06	0.12
Copper	0.05	0.07	0.01	0.02	0.43	0.53	0.30	0.37	0.24	0.30	0.05	0.06	0.62	0.77	0.33	0.41
Manganese	0.03	0.30	0.00	0.04	0.05	0.54	0.02	0.22	0.05	0.49	0.01	0.11	0.07	0.73	0.03	0.29
Molybdenum	0.01	0.11	0.00	0.02	N/A	N/A	N/A	N/A	0.02	0.25	0.01	0.05	N/A	N/A	N/A	N/A
Nickel	0.03	0.04	0.01	0.01	0.05	0.07	0.02	0.03	0.42	0.58	0.07	0.09	0.44	0.61	0.08	0.12
Selenium	0.40	0.80	0.03	0.05	0.65	**1.30**	0.22	0.43	0.04	0.08	0.01	0.02	0.29	0.58	0.20	0.39
Uranium	0.01	0.08	0.00	0.02	0.02	0.16	0.01	0.08	0.17	**1.68**	0.03	0.32	0.18	**1.75**	0.04	0.37
Vanadium	0.05	0.50	0.01	0.08	N/A	N/A	N/A	N/A	0.04	0.38	0.01	0.09	N/A	N/A	N/A	N/A
Zinc	0.03	0.57	0.01	0.14	0.30	**6.43**	0.21	**4.54**	0.46	**9.78**	0.07	**1.46**	0.73	**15.64**	0.28	**5.86**

	Upper Eastern Drainage								Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.05	0.21	0.02	0.06	0.12	0.48	0.07	0.27	0.10	0.39	0.03	0.11	0.17	0.67	0.08	0.32
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.07	0.00	0.02	0.86	**3.43**	0.64	**2.54**	0.38	**1.50**	0.10	0.40	**1.22**	**4.86**	0.73	**2.92**
Cobalt	0.03	0.06	0.01	0.02	0.11	0.20	0.06	0.12	0.08	0.15	0.03	0.05	0.15	0.29	0.08	0.16
Copper	0.08	0.10	0.02	0.03	0.24	0.29	0.14	0.17	0.10	0.12	0.03	0.04	0.25	0.31	0.15	0.19
Manganese	0.01	0.13	0.00	0.03	0.07	0.70	0.05	0.45	0.21	**2.07**	0.06	0.59	0.26	**2.63**	0.10	**1.01**
Molybdenum	0.01	0.11	0.00	0.02	N/A	N/A	N/A	N/A	0.03	0.30	0.01	0.09	N/A	N/A	N/A	N/A
Nickel	0.04	0.05	0.01	0.01	0.11	0.16	0.07	0.09	0.35	0.49	0.11	0.15	0.43	0.60	0.17	0.23
Selenium	0.02	0.04	0.01	0.02	**3.30**	**6.60**	**2.47**	**4.94**	0.09	0.17	0.02	0.05	**3.36**	**6.73**	**2.48**	**4.97**
Uranium	0.00	0.03	0.00	0.01	0.01	0.07	0.00	0.04	0.01	0.09	0.00	0.04	0.01	0.14	0.01	0.07
Vanadium	0.03	0.32	0.01	0.10	N/A	N/A	N/A	N/A	0.04	0.38	0.01	0.13	N/A	N/A	N/A	N/A
Zinc	0.03	0.74	0.01	0.24	0.23	**4.97**	0.16	**3.42**	0.16	**3.43**	0.05	**1.08**	0.36	**7.66**	0.20	**4.25**

b) PIA: Blue Creek

	Middle Blue Creek								Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.03	0.11	0.01	0.03	0.06	0.23	0.03	0.11	0.05	0.18	0.02	0.07	0.07	0.30	0.04	0.16
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.04	0.17	0.01	0.04	0.27	**1.08**	0.18	0.72	0.00	0.02	0.00	0.01	0.23	0.93	0.17	0.69
Cobalt	0.05	0.09	0.01	0.02	0.07	0.13	0.02	0.04	0.01	0.02	0.00	0.01	0.03	0.06	0.02	0.03
Copper	0.05	0.06	0.01	0.01	0.25	0.31	0.16	0.20	0.03	0.04	0.01	0.02	0.24	0.29	0.17	0.20
Manganese	0.05	0.46	0.01	0.09	0.19	**1.87**	0.12	**1.15**	0.01	0.05	0.00	0.02	0.15	**1.47**	0.11	**1.08**
Molybdenum	0.00	0.05	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.08	0.11	0.02	0.02	0.16	0.22	0.08	0.11	0.01	0.02	0.01	0.01	0.10	0.13	0.07	0.09
Selenium	0.05	0.10	0.01	0.02	0.22	0.43	0.14	0.27	0.04	0.08	0.02	0.03	0.21	0.41	0.14	0.28
Uranium	0.00	0.03	0.00	0.01	0.01	0.10	0.01	0.06	0.00	0.01	0.00	0.00	0.01	0.07	0.01	0.05
Vanadium	0.02	0.22	0.01	0.06	N/A	N/A	N/A	N/A	0.02	0.17	0.01	0.07	N/A	N/A	N/A	N/A
Zinc	0.06	**1.18**	0.01	0.29	0.31	**6.62**	0.21	**4.37**	0.02	0.47	0.01	0.19	0.28	**5.91**	0.20	**4.27**

AOI: Area of interest
PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table QC 2. Summary of Hazard Quotient Calculations
Receptor: Muskrat (Herbivorous Mammal)
Riparian Sediments
Midnite Mine Site
Wellpinit, WA

a) PIA: Western, Central, and Eastern Drainages

	Western Drainage								Central Drainage							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.06	0.00	0.02					0.01	0.07	0.00	0.03				
Arsenic	0.00	0.02	0.00	0.01					0.01	0.07	0.01	0.03				
Beryllium	0.00	0.01	0.00	0.00					0.01	0.06	0.00	0.02				
Cadmium	0.00	0.01	0.00	0.00					0.01	0.09	0.00	0.05				
Cobalt	0.00	0.01	0.00	0.00					0.02	0.08	0.01	0.04				
Copper	0.00	0.00	0.00	0.00					0.01	0.01	0.00	0.00				
Manganese	0.04	0.12	0.01	0.04					0.09	0.28	0.05	0.17				
Molybdenum	0.01	0.06	0.00	0.03					0.01	0.13	0.01	0.07				
Nickel	0.00	0.00	0.00	0.00					0.03	0.05	0.01	0.02				
Selenium	0.04	0.37	0.01	0.06					0.00	0.04	0.00	0.02				
Uranium	0.08	0.79	0.05	0.51					**1.56**	**15.6**	0.68	**6.79**				
Vanadium	0.08	0.79	0.03	0.29					0.06	0.60	0.03	0.33				
Zinc	0.00	0.01	0.00	0.01					0.01	0.14	0.00	0.05				

	Upper Eastern Drainage								Lower Eastern Drainage							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.05	0.00	0.03					0.00	0.04	0.00	0.04				
Arsenic	0.00	0.02	0.00	0.01					0.01	0.03	0.00	0.02				
Beryllium	0.00	0.01	0.00	0.01					0.00	0.02	0.00	0.01				
Cadmium	0.00	0.01	0.00	0.00					0.02	0.16	0.01	0.10				
Cobalt	0.00	0.01	0.00	0.01					0.01	0.02	0.00	0.02				
Copper	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00				
Manganese	0.02	0.06	0.01	0.02					0.22	0.71	0.14	0.46				
Molybdenum	0.01	0.06	0.00	0.03					0.02	0.16	0.01	0.11				
Nickel	0.00	0.01	0.00	0.00					0.02	0.04	0.01	0.02				
Selenium	0.00	0.02	0.00	0.03					0.01	0.08	0.01	0.05				
Uranium	0.03	0.27	0.02	0.16					0.09	0.87	0.08	0.79				
Vanadium	0.05	0.50	0.04	0.38					0.06	0.59	0.05	0.45				
Zinc	0.00	0.01	0.00	0.01					0.00	0.05	0.00	0.03				

b) PIA: Blue Creek

	Middle Blue Creek								Lower Blue Creek							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.05	0.00	0.03					0.01	0.06	0.00	0.04				
Arsenic	0.00	0.01	0.00	0.01					0.00	0.02	0.00	0.01				
Beryllium	0.00	0.01	0.00	0.00					0.00	0.00	0.00	0.00				
Cadmium	0.00	0.02	0.00	0.01					0.00	0.00	0.00	0.00				
Cobalt	0.00	0.01	0.00	0.01					0.00	0.00	0.00	0.00				
Copper	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00				
Manganese	0.05	0.16	0.02	0.07					0.01	0.02	0.00	0.02				
Molybdenum	0.00	0.03	0.00	0.01					0.00	0.00	0.00	0.00				
Nickel	0.00	0.01	0.00	0.00					0.00	0.00	0.00	0.00				
Selenium	0.01	0.06	0.00	0.04					0.00	0.04	0.00	0.03				
Uranium	0.03	0.33	0.02	0.25					0.01	0.06	0.01	0.06				
Vanadium	0.04	0.35	0.02	0.23					0.03	0.27	0.02	0.24				
Zinc	0.00	0.02	0.00	0.01					0.00	0.01	0.00	0.01				

PIA: Potentially impacted area
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Appendix R - Summary Tables of Hazard Quotients for Each Location
Midnite Mine Site
Wellpinit, Washington

Table R 1. Summary of Hazard Quotient Calculations (Mammals)
AOI: Mined Area, Soils (Using Water Concentrations from Pit 3)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.18	0.89	0.01	0.03	0.75	**3.76**	0.30	**1.50**	0.25	**1.27**	0.06	0.29
Cadmium	0.02	0.20	0.00	0.03	0.52	**5.23**	0.28	**2.84**	0.22	**2.21**	0.12	**1.17**
Chromium	0.01	0.08	0.00	0.01	0.09	0.90	0.01	0.12	0.04	0.36	0.00	0.02
Cobalt	0.02	0.10	0.01	0.04	0.24	0.96	0.03	0.11	0.10	0.41	0.01	0.05
Copper	0.02	0.03	0.00	0.00	0.97	**1.41**	0.06	0.09	0.41	0.60	0.02	0.03
Lead	0.01	0.08	0.00	0.01	0.14	**1.44**	0.01	0.09	0.06	0.60	0.00	0.01
Manganese	0.27	0.88	0.06	0.19	**1.80**	**5.83**	0.93	**3.01**	0.72	**2.33**	0.34	**1.11**
Molybdenum	0.12	**1.19**	0.01	0.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.03	0.05	0.01	0.01	0.20	0.37	0.06	0.11	0.08	0.15	0.02	0.04
Selenium	**2.64**	**26.4**	0.05	0.54	**3.21**	**32.1**	**2.69**	**26.9**	0.30	**3.04**	0.08	0.79
Thallium	0.02	0.24	0.00	0.02	0.18	**1.80**	0.04	0.44	0.07	0.69	0.01	0.10
Uranium	**2.15**	**21.5**	0.59	**5.89**	**52.8**	**528**	**2.40**	**24.0**	**22.5**	**225**	0.70	**6.99**
Vanadium	0.45	**4.46**	0.04	0.38	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.02	0.19	0.00	0.03	0.21	**2.08**	0.07	0.71	0.08	0.85	0.03	0.25

	White-tailed Deer							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.75	**3.79**	0.00	0.01	0.78	**3.94**	0.01	0.06
Cadmium	0.06	0.65	0.00	0.01	0.13	**1.29**	0.02	0.21
Chromium	0.04	0.36	0.00	0.00	0.04	0.36	0.00	0.01
Cobalt	0.06	0.26	0.00	0.01	0.06	0.26	0.00	0.01
Copper	0.08	0.11	0.00	0.00	0.09	0.13	0.00	0.01
Lead	0.03	0.32	0.00	0.00	0.03	0.33	0.00	0.00
Manganese	0.86	**2.78**	0.02	0.07	**1.02**	**3.30**	0.07	0.23
Molybdenum	0.51	**5.08**	0.01	0.06	N/A	N/A	N/A	N/A
Nickel	0.07	0.12	0.00	0.00	0.08	0.14	0.01	0.01
Selenium	**11.1**	**111**	0.02	0.22	**11.1**	**111**	0.03	0.27
Thallium	0.10	**1.02**	0.00	0.01	0.11	**1.07**	0.00	0.02
Uranium	**5.86**	**58.6**	0.20	**2.04**	**5.93**	**59.3**	0.22	**2.24**
Vanadium	**1.90**	**19.0**	0.02	0.16	N/A	N/A	N/A	N/A
Zinc	0.07	0.66	0.00	0.01	0.08	0.79	0.01	0.05

	Coyote							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.22	0.00	0.01	0.15	0.75	0.00	0.02
Cadmium	0.01	0.05	0.00	0.02	**6.38**	**63.8**	0.15	**1.49**
Chromium	0.00	0.02	0.00	0.00	0.06	0.58	0.00	0.05
Cobalt	0.01	0.02	0.00	0.02	0.02	0.07	0.01	0.02
Copper	0.00	0.01	0.00	0.00	0.20	0.29	0.02	0.03
Lead	0.00	0.02	0.00	0.00	0.17	**1.70**	0.01	0.10
Manganese	0.07	0.23	0.03	0.09	0.16	0.52	0.03	0.10
Molybdenum	0.03	0.29	0.00	0.03	**1.04**	**10.4**	0.10	**1.02**
Nickel	0.01	0.01	0.00	0.01	0.08	0.14	0.01	0.02
Selenium	0.65	**6.49**	0.01	0.13	**38.7**	**387**	0.54	**5.40**
Thallium	0.01	0.06	0.00	0.00	0.03	0.31	0.00	0.02
Uranium	0.56	**5.59**	0.28	**2.78**	**6.37**	**63.7**	0.58	**5.84**
Vanadium	0.11	**1.10**	0.01	0.07	0.18	**1.82**	0.01	0.12
Zinc	0.00	0.05	0.00	0.01	**1.67**	**16.7**	0.07	0.72

	Bobcat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.29	0.00	0.01	0.20	0.99	0.00	0.02
Cadmium	0.01	0.06	0.00	0.02	**8.40**	**84.0**	0.16	**1.59**
Chromium	0.00	0.03	0.00	0.00	0.08	0.76	0.00	0.05
Cobalt	0.01	0.03	0.00	0.02	0.02	0.08	0.01	0.03
Copper	0.01	0.01	0.00	0.00	0.27	0.39	0.02	0.03
Lead	0.00	0.02	0.00	0.00	0.22	**2.24**	0.01	0.11
Manganese	0.08	0.27	0.03	0.09	0.20	0.66	0.03	0.11
Molybdenum	0.04	0.38	0.00	0.03	**1.37**	**13.7**	0.11	**1.09**
Nickel	0.01	0.01	0.00	0.01	0.10	0.19	0.01	0.02
Selenium	0.84	**8.45**	0.01	0.14	**50.9**	**509**	0.57	**5.74**
Thallium	0.01	0.08	0.00	0.00	0.04	0.41	0.00	0.02
Uranium	0.64	**6.36**	0.29	**2.88**	**8.28**	**82.8**	0.61	**6.13**
Vanadium	0.14	**1.44**	0.01	0.08	0.24	**2.38**	0.01	0.13
Zinc	0.01	0.06	0.00	0.01	**2.20**	**22.0**	0.08	0.77

	Deer Mouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**2.69**	**13.6**	0.03	0.15	**2.88**	**14.5**	0.09	0.44
Cadmium	0.18	**1.78**	0.00	0.04	0.61	**6.09**	0.14	**1.36**
Chromium	0.13	**1.26**	0.00	0.05	0.14	**1.40**	0.01	0.09
Cobalt	0.13	0.52	0.02	0.06	0.15	0.60	0.02	0.09
Copper	0.26	0.38	0.01	0.02	0.76	**1.11**	0.17	0.25
Lead	0.11	**1.14**	0.00	0.03	0.13	**1.27**	0.01	0.07
Manganese	**2.29**	**7.40**	0.09	0.30	**3.13**	**10.1**	0.35	**1.13**
Molybdenum	**1.82**	**18.2**	0.09	0.91	N/A	N/A	N/A	N/A
Nickel	0.14	0.25	0.01	0.02	0.19	0.34	0.03	0.05
Selenium	**39.2**	**392**	0.28	**2.81**	**39.5**	**395**	0.39	**3.88**
Thallium	0.37	**3.67**	0.01	0.09	0.4	**4.21**	0.03	0.25
Uranium	**12.5**	**125**	0.71	**7.14**	**13.1**	**131**	0.91	**9.10**
Vanadium	**6.82**	**68.2**	0.23	**2.30**	N/A	N/A	N/A	N/A
Zinc	0.19	**1.94**	0.01	0.06	0.41	**4.11**	0.07	0.72

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**2.91**	**14.6**	0.06	0.33	**51.9**	**262**	**1.15**	**5.78**
Cadmium	0.20	**2.02**	0.01	0.14	**617**	**6169**	**14.2**	**142**
Chromium	0.14	**1.36**	0.01	0.11	**28.4**	**284**	**2.21**	**22.1**
Cobalt	0.16	0.64	0.05	0.19	0.84	**3.36**	0.17	0.68
Copper	0.28	0.41	0.03	0.05	**27.7**	**40.4**	**2.66**	**3.88**
Lead	0.12	**1.23**	0.01	0.07	**511**	**5113**	**30.2**	**302**
Manganese	**2.62**	**8.45**	0.29	0.93	**12.0**	**38.9**	0.75	**2.43**
Molybdenum	**1.96**	**19.6**	0.19	**1.92**	**76.8**	**768**	**7.52**	**75.2**
Nickel	0.17	0.31	0.03	0.06	**17.6**	**32.0**	**2.00**	**3.64**
Selenium	**42.3**	**423**	0.61	**6.11**	**10588**	**105876**	**146**	**1462**
Thallium	0.40	**3.95**	0.02	0.19	**7.60**	**76.0**	0.35	**3.50**
Uranium	**15.0**	**150**	**2.48**	**24.8**	**28.0**	**280**	**3.16**	**31.6**
Vanadium	**7.35**	**73.5**	0.49	**4.86**	**19.2**	**192**	**1.27**	**12.7**
Zinc	0.22	**2.17**	0.02	0.17	**179**	**1790**	**7.60**	**76.0**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 2. Summary of Hazard Quotient Calculations (Birds)
AOI: Mined Area, Soils (Using Water Concentrations from Pit 3)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow								Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.03	0.13	0.00	0.00	0.10	0.39	0.06	0.24	0.17	0.67	0.01	0.04	0.22	0.86	0.05	0.19
Cadmium	0.01	0.03	0.00	0.01	0.28	**1.10**	0.25	**1.00**	0.02	0.09	0.00	0.01	0.19	0.77	0.14	0.57
Chromium	0.04	0.21	0.00	0.01	0.35	**1.75**	0.29	**1.43**	0.21	**1.06**	0.04	0.20	0.25	**1.26**	0.07	0.35
Cobalt	0.01	0.01	0.00	0.01	0.03	0.05	0.02	0.04	0.01	0.03	0.01	0.01	0.02	0.03	0.01	0.02
Copper	0.01	0.01	0.00	0.00	**1.47**	**1.81**	**1.34**	**1.66**	0.04	0.05	0.01	0.01	0.08	0.10	0.04	0.06
Lead	0.02	0.18	0.00	0.01	0.18	**1.81**	0.15	**1.51**	0.09	0.90	0.01	0.13	0.10	0.99	0.02	0.20
Manganese	0.00	0.04	0.00	0.02	0.01	0.12	0.01	0.09	0.01	0.12	0.00	0.03	0.03	0.29	0.02	0.17
Molybdenum	0.00	0.03	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.01	0.03	0.04	0.02	0.03	0.02	0.02	0.01	0.01	0.03	0.05	0.02	0.03
Selenium	0.36	0.73	0.01	0.01	0.63	**1.25**	0.25	0.50	**1.82**	**3.64**	0.06	0.13	**1.83**	**3.67**	0.08	0.15
Thallium	0.01	0.06	0.00	0.00	0.06	0.65	0.05	0.54	0.03	0.33	0.00	0.04	0.04	0.45	0.01	0.13
Uranium	0.00	0.04	0.00	0.02	0.01	0.08	0.01	0.05	0.01	0.09	0.00	0.03	0.01	0.10	0.00	0.03
Vanadium	0.00	0.04	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.01	0.23	0.00	0.07	0.49	**10.4**	0.44	**9.40**	0.03	0.72	0.01	0.13	0.08	**1.77**	0.05	0.99

	American Robin								Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.14	0.55	0.01	0.03	**1.24**	**4.95**	0.06	0.25	0.31	**1.25**	0.00	0.00	0.36	**1.45**	0.00	0.01
Cadmium	0.02	0.07	0.00	0.01	**22.2**	**88.8**	**1.18**	**4.71**	0.03	0.13	0.00	0.00	**4.98**	**19.9**	0.12	0.47
Chromium	0.17	0.87	0.03	0.16	**17.3**	**86.3**	**3.08**	**15.4**	0.39	**1.97**	0.00	0.02	**1.12**	**5.61**	0.06	0.31
Cobalt	0.01	0.02	0.01	0.01	0.03	0.05	0.01	0.02	0.02	0.03	0.00	0.00	0.02	0.04	0.00	0.00
Copper	0.03	0.04	0.01	0.01	**1.59**	**1.96**	0.35	0.43	0.07	0.09	0.00	0.00	0.32	0.39	0.02	0.03
Lead	0.07	0.74	0.01	0.10	**145**	**1450**	**19.7**	**197**	0.17	**1.67**	0.00	0.01	**1.20**	**12.0**	0.06	0.63
Manganese	0.01	0.09	0.00	0.02	0.02	0.23	0.00	0.04	0.02	0.17	0.00	0.01	0.02	0.20	0.00	0.01
Molybdenum	0.01	0.12	0.00	0.03	0.22	**2.25**	0.05	0.51	0.03	0.27	0.00	0.00	0.09	0.89	0.01	0.06
Nickel	0.01	0.02	0.00	0.01	0.50	0.70	0.13	0.18	0.02	0.03	0.00	0.00	0.06	0.09	0.01	0.01
Selenium	**1.49**	**2.99**	0.05	0.10	**177**	**353**	**5.60**	**11.2**	**3.35**	**6.70**	0.01	0.01	**17.0**	**34.0**	0.20	0.39
Thallium	0.03	0.27	0.00	0.03	0.26	**2.64**	0.03	0.28	0.06	0.62	0.00	0.00	0.08	0.80	0.00	0.01
Uranium	0.01	0.06	0.00	0.02	0.01	0.08	0.00	0.02	0.01	0.10	0.00	0.01	0.03	0.31	0.00	0.02
Vanadium	0.02	0.15	0.00	0.02	0.03	0.27	0.00	0.04	0.03	0.34	0.00	0.00	0.04	0.36	0.00	0.00
Zinc	0.03	0.56	0.00	0.09	**9.60**	**204**	0.94	**19.9**	0.05	**1.11**	0.00	0.02	**1.98**	**42.1**	0.08	**1.79**

	American Kestrel								Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.33	**1.34**	0.00	0.01	0.39	**1.56**	0.01	0.02	0.04	0.18	0.00	0.01	0.05	0.21	0.01	0.04
Cadmium	0.04	0.14	0.00	0.01	**5.33**	**21.3**	0.36	**1.45**	0.01	0.02	0.00	0.01	0.03	0.12	0.03	0.10
Chromium	0.42	**2.11**	0.01	0.05	**1.20**	**6.01**	0.19	0.95	0.06	0.28	0.01	0.07	0.06	0.31	0.02	0.10
Cobalt	0.02	0.03	0.00	0.01	0.02	0.04	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Copper	0.08	0.10	0.00	0.00	0.34	0.42	0.08	0.09	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01
Lead	0.18	**1.79**	0.00	0.04	**1.28**	**12.8**	0.20	**1.96**	0.02	0.24	0.00	0.04	0.03	0.25	0.01	0.06
Manganese	0.02	0.18	0.00	0.01	0.02	0.22	0.00	0.02	0.00	0.03	0.00	0.01	0.01	0.06	0.00	0.04
Molybdenum	0.03	0.29	0.00	0.01	0.10	0.95	0.02	0.20	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.02	0.03	0.00	0.00	0.07	0.09	0.02	0.03	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Selenium	**3.59**	**7.19**	0.02	0.04	**18.2**	**36.4**	0.61	**1.22**	0.48	0.96	0.02	0.04	0.48	0.96	0.02	0.05
Thallium	0.07	0.66	0.00	0.01	0.09	0.85	0.00	0.04	0.01	0.09	0.00	0.01	0.01	0.10	0.00	0.03
Uranium	0.01	0.11	0.00	0.01	0.03	0.34	0.00	0.05	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.04	0.37	0.00	0.01	0.04	0.39	0.00	0.01	0.00	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.06	**1.22**	0.00	0.06	**2.12**	**45.1**	0.26	**5.54**	0.01	0.19	0.00	0.05	0.02	0.35	0.01	0.20

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.17	0.67	0.01	0.04	0.21	0.83	0.04	0.16
Cadmium	0.02	0.09	0.00	0.01	0.17	0.66	0.12	0.49
Chromium	0.21	**1.06**	0.04	0.20	0.28	**1.42**	0.10	0.49
Cobalt	0.01	0.03	0.01	0.01	0.02	0.03	0.01	0.02
Copper	0.04	0.05	0.01	0.01	0.30	0.37	0.22	0.27
Lead	0.09	0.90	0.01	0.13	0.12	**1.21**	0.04	0.38
Manganese	0.01	0.12	0.00	0.03	0.02	0.23	0.01	0.12
Molybdenum	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A
Nickel	0.02	0.02	0.01	0.01	0.03	0.04	0.02	0.02
Selenium	**1.82**	**3.64**	0.06	0.13	**1.87**	**3.74**	0.10	0.21
Thallium	0.03	0.33	0.00	0.04	0.05	0.49	0.02	0.17
Uranium	0.01	0.09	0.00	0.03	0.01	0.10	0.00	0.04
Vanadium	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.03	0.72	0.01	0.13	0.14	**2.94**	0.09	**1.95**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 3. Summary of Hazard Quotient Calculations (Mammals)
AOI: Mined Area, Soils (Using Water Concentrations from Pollution Control Pond)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.18	0.89	0.01	0.03	0.75	**3.77**	0.30	**1.50**	0.25	**1.27**	0.06	0.29
Cadmium	0.02	0.20	0.00	0.03	0.52	**5.23**	0.28	**2.84**	0.22	**2.21**	0.12	**1.18**
Chromium	0.01	0.08	0.00	0.01	0.09	0.90	0.01	0.12	0.04	0.36	0.00	0.02
Cobalt	0.03	0.11	0.01	0.04	0.24	0.98	0.03	0.13	0.10	0.42	0.01	0.05
Copper	0.02	0.03	0.00	0.00	0.97	**1.41**	0.06	0.09	0.41	0.60	0.02	0.03
Lead	0.01	0.08	0.00	0.01	0.14	**1.44**	0.01	0.09	0.06	0.60	0.00	0.01
Manganese	0.30	0.97	0.06	0.19	**1.83**	**5.91**	0.96	**3.09**	0.72	**2.33**	0.34	**1.11**
Molybdenum	0.12	**1.19**	0.01	0.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.03	0.05	0.01	0.01	0.21	0.38	0.06	0.11	0.08	0.15	0.02	0.04
Selenium	**2.64**	**26.4**	0.05	0.50	**3.22**	**32.2**	**2.70**	**27.0**	0.30	**3.00**	0.08	0.75
Thallium	0.02	0.24	0.00	0.01	0.18	**1.80**	0.04	0.44	0.07	0.69	0.01	0.10
Uranium	**2.51**	**25.1**	0.60	**6.03**	**53.1**	**531**	**2.77**	**27.7**	**22.5**	**225**	0.71	**7.12**
Vanadium	0.45	**4.46**	0.04	0.38	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.02	0.20	0.00	0.03	0.21	**2.09**	0.07	0.72	0.08	0.85	0.03	0.25

	White-tailed Deer							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.75	**3.79**	0.00	0.01	0.78	**3.94**	0.01	0.06
Cadmium	0.06	0.65	0.00	0.01	0.13	**1.29**	0.02	0.21
Chromium	0.04	0.36	0.00	0.00	0.04	0.36	0.00	0.01
Cobalt	0.07	0.28	0.00	0.02	0.07	0.29	0.00	0.02
Copper	0.08	0.11	0.00	0.00	0.09	0.13	0.00	0.01
Lead	0.03	0.32	0.00	0.00	0.03	0.32	0.00	0.00
Manganese	0.91	**2.94**	0.02	0.07	**1.07**	**3.46**	0.07	0.23
Molybdenum	0.51	**5.08**	0.01	0.06	N/A	N/A	N/A	N/A
Nickel	0.07	0.13	0.00	0.00	0.08	0.15	0.01	0.01
Selenium	**11.1**	**111**	0.02	0.21	**11.1**	**111**	0.03	0.25
Thallium	0.10	**1.02**	0.00	0.01	0.11	**1.07**	0.00	0.02
Uranium	**6.60**	**66.0**	0.21	**2.09**	**6.66**	**66.6**	0.23	**2.28**
Vanadium	**1.90**	**19.0**	0.02	0.16	N/A	N/A	N/A	N/A
Zinc	0.07	0.68	0.00	0.01	0.08	0.80	0.01	0.05

	Coyote							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.22	0.00	0.01	0.15	0.75	0.00	0.02
Cadmium	0.01	0.05	0.00	0.02	**6.38**	**63.8**	0.15	**1.49**
Chromium	0.00	0.02	0.00	0.00	0.06	0.58	0.00	0.05
Cobalt	0.01	0.03	0.00	0.02	0.02	0.07	0.01	0.03
Copper	0.00	0.01	0.00	0.00	0.20	0.29	0.02	0.03
Lead	0.00	0.02	0.00	0.00	0.17	**1.70**	0.01	0.10
Manganese	0.08	0.25	0.03	0.09	0.17	0.55	0.03	0.10
Molybdenum	0.03	0.29	0.00	0.03	**1.04**	**10.4**	0.10	**1.02**
Nickel	0.01	0.01	0.00	0.01	0.08	0.14	0.01	0.02
Selenium	0.65	**6.51**	0.01	0.11	**38.7**	**387**	0.54	**5.38**
Thallium	0.01	0.06	0.00	0.00	0.03	0.31	0.00	0.01
Uranium	0.66	**6.57**	0.28	**2.85**	**6.47**	**64.7**	0.59	**5.90**
Vanadium	0.11	**1.10**	0.01	0.07	0.18	**1.82**	0.01	0.12
Zinc	0.01	0.05	0.00	0.01	**1.67**	**16.7**	0.07	0.72

	Bobcat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.29	0.00	0.01	0.20	0.99	0.00	0.02
Cadmium	0.01	0.06	0.00	0.02	**8.40**	**84.0**	0.16	**1.59**
Chromium	0.00	0.03	0.00	0.00	0.08	0.76	0.00	0.05
Cobalt	0.01	0.03	0.01	0.02	0.02	0.09	0.01	0.03
Copper	0.01	0.01	0.00	0.00	0.27	0.39	0.02	0.03
Lead	0.00	0.02	0.00	0.00	0.22	**2.24**	0.01	0.11
Manganese	0.09	0.29	0.03	0.09	0.21	0.68	0.03	0.11
Molybdenum	0.04	0.38	0.00	0.03	**1.37**	**13.7**	0.11	**1.09**
Nickel	0.01	0.01	0.00	0.01	0.10	0.19	0.01	0.02
Selenium	0.85	**8.47**	0.01	0.12	**50.92**	**509**	0.57	**5.72**
Thallium	0.01	0.08	0.00	0.00	0.04	0.41	0.00	0.02
Uranium	0.74	**7.40**	0.29	**2.95**	**8.38**	**83.8**	0.62	**6.20**
Vanadium	0.14	**1.44**	0.01	0.08	0.24	**2.38**	0.01	0.13
Zinc	0.01	0.06	0.00	0.01	**2.20**	**22.0**	0.08	0.77

	Deer Mouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**2.69**	**13.6**	0.03	0.15	**2.88**	**14.5**	0.09	0.44
Cadmium	0.18	**1.78**	0.00	0.04	0.61	**6.09**	0.14	**1.36**
Chromium	0.13	**1.26**	0.00	0.05	0.14	**1.40**	0.01	0.09
Cobalt	0.14	0.54	0.02	0.07	0.16	0.62	0.02	0.09
Copper	0.26	0.38	0.01	0.02	0.77	**1.11**	0.17	0.25
Lead	0.11	**1.14**	0.00	0.03	0.13	**1.26**	0.01	0.07
Manganese	**2.32**	**7.51**	0.09	0.30	**3.16**	**10.2**	0.35	**1.13**
Molybdenum	**1.82**	**18.2**	0.09	0.91	N/A	N/A	N/A	N/A
Nickel	0.14	0.26	0.01	0.02	0.19	0.35	0.03	0.05
Selenium	**39.2**	**392**	0.28	**2.78**	**39.5**	**395**	0.38	**3.85**
Thallium	0.37	**3.67**	0.01	0.09	0.42	**4.21**	0.03	0.25
Uranium	**13.0**	**130**	0.72	**7.24**	**13.6**	**136**	0.92	**9.20**
Vanadium	**6.82**	**68.2**	0.23	**2.30**	N/A	N/A	N/A	N/A
Zinc	0.20	**1.95**	0.01	0.06	0.41	**4.12**	0.07	0.73

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	**2.91**	**14.6**	0.06	0.32	**51.9**	**262**	**1.15**	**5.78**
Cadmium	0.20	**2.02**	0.01	0.15	**617**	**6169**	**14.2**	**142**
Chromium	0.14	**1.36**	0.01	0.11	**28.4**	**284**	**2.21**	**22.1**
Cobalt	0.17	0.67	0.05	0.21	0.85	**3.40**	0.18	0.70
Copper	0.28	0.41	0.03	0.04	**27.7**	**40.4**	**2.66**	**3.88**
Lead	0.12	**1.23**	0.01	0.07	**511**	**5113**	**30.2**	**302**
Manganese	**2.68**	**8.66**	0.29	0.94	**12.1**	**39.1**	0.75	**2.44**
Molybdenum	**1.96**	**19.6**	0.19	**1.92**	**76.8**	**768**	**7.52**	**75.2**
Nickel	0.17	0.32	0.04	0.07	**17.6**	**32.0**	**2.00**	**3.65**
Selenium	**42.3**	**423**	0.60	**5.97**	**10588**	**105876**	**146**	**1461**
Thallium	0.40	**3.95**	0.02	0.18	**7.60**	**76.0**	0.35	**3.49**
Uranium	**16.0**	**160**	**2.53**	**25.3**	**28.9**	**289**	**3.21**	**32.1**
Vanadium	**7.35**	**73.5**	0.49	**4.86**	**19.2**	**192**	**1.27**	**12.7**
Zinc	0.22	**2.19**	0.02	0.17	**179**	**1790**	**7.60**	**76.0**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 4. Summary of Hazard Quotient Calculations (Birds)
AOI: Mined Area, Soils (Using Water Concentrations from Pollution Control Pond)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow								Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.03	0.13	0.00	0.00	0.10	0.39	0.06	0.24	0.17	0.67	0.01	0.04	0.22	0.86	0.05	0.19
Cadmium	0.01	0.03	0.00	0.01	0.28	**1.10**	0.25	**1.00**	0.02	0.09	0.00	0.01	0.19	0.77	0.14	0.57
Chromium	0.04	0.21	0.00	0.01	0.35	**1.75**	0.29	**1.43**	0.21	**1.06**	0.04	0.20	0.25	**1.25**	0.07	0.35
Cobalt	0.01	0.02	0.01	0.01	0.03	0.05	0.02	0.05	0.02	0.03	0.01	0.02	0.02	0.03	0.01	0.02
Copper	0.01	0.01	0.00	0.00	**1.47**	**1.81**	**1.34**	**1.66**	0.04	0.05	0.01	0.01	0.08	0.10	0.04	0.06
Lead	0.02	0.18	0.00	0.01	0.18	**1.81**	0.15	**1.51**	0.09	0.90	0.01	0.13	0.10	0.99	0.02	0.20
Manganese	0.00	0.05	0.00	0.02	0.01	0.13	0.01	0.09	0.01	0.12	0.00	0.03	0.03	0.29	0.02	0.17
Molybdenum	0.00	0.03	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.01	0.03	0.04	0.02	0.03	0.02	0.02	0.01	0.01	0.04	0.05	0.02	0.03
Selenium	0.37	0.73	0.01	0.01	0.63	**1.26**	0.25	0.49	**1.82**	**3.64**	0.06	0.12	**1.84**	**3.67**	0.07	0.15
Thallium	0.01	0.06	0.00	0.00	0.06	0.65	0.05	0.54	0.03	0.33	0.00	0.04	0.04	0.45	0.01	0.13
Uranium	0.01	0.05	0.00	0.02	0.01	0.08	0.01	0.05	0.01	0.10	0.00	0.03	0.01	0.10	0.00	0.04
Vanadium	0.00	0.04	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.01	0.24	0.00	0.08	0.49	**10.4**	0.44	**9.41**	0.03	0.73	0.01	0.13	0.08	**1.78**	0.05	0.99

	American Robin								Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.14	0.55	0.01	0.03	**1.24**	**4.95**	0.06	0.25	0.31	**1.25**	0.00	0.00	0.36	**1.45**	0.00	0.01
Cadmium	0.02	0.07	0.00	0.01	**22.2**	**88.8**	**1.18**	**4.71**	0.03	0.13	0.00	0.00	**4.98**	**19.9**	0.12	0.47
Chromium	0.17	0.87	0.03	0.16	**17.3**	**86.3**	**3.08**	**15.4**	0.39	**1.97**	0.00	0.02	**1.12**	**5.61**	0.06	0.31
Cobalt	0.01	0.02	0.01	0.01	0.03	0.05	0.01	0.02	0.02	0.03	0.00	0.00	0.02	0.04	0.00	0.01
Copper	0.03	0.04	0.01	0.01	**1.59**	**1.96**	0.35	0.43	0.08	0.09	0.00	0.00	0.32	0.39	0.02	0.03
Lead	0.07	0.74	0.01	0.10	**145**	**1450**	**19.7**	**197**	0.17	**1.67**	0.00	0.01	**1.20**	**12.0**	0.06	0.63
Manganese	0.01	0.09	0.00	0.02	0.02	0.23	0.00	0.04	0.02	0.17	0.00	0.01	0.02	0.20	0.00	0.01
Molybdenum	0.01	0.12	0.00	0.03	0.22	**2.25**	0.05	0.51	0.03	0.27	0.00	0.00	0.09	0.89	0.01	0.06
Nickel	0.01	0.02	0.00	0.01	0.51	0.70	0.13	0.18	0.02	0.03	0.00	0.00	0.06	0.09	0.01	0.01
Selenium	**1.49**	**2.99**	0.05	0.10	**177**	**353**	**5.60**	**11.2**	**3.35**	**6.71**	0.01	0.01	**17.0**	**34.0**	0.20	0.39
Thallium	0.03	0.27	0.00	0.03	0.26	**2.64**	0.03	0.28	0.06	0.62	0.00	0.00	0.08	0.80	0.00	0.01
Uranium	0.01	0.07	0.00	0.02	0.01	0.09	0.00	0.02	0.01	0.10	0.00	0.01	0.03	0.31	0.00	0.02
Vanadium	0.02	0.15	0.00	0.02	0.03	0.27	0.00	0.04	0.03	0.34	0.00	0.00	0.04	0.36	0.00	0.00
Zinc	0.03	0.57	0.00	0.10	**9.60**	**204**	0.94	**19.9**	0.05	**1.12**	0.00	0.02	**1.98**	**42.1**	0.08	**1.79**

	American Kestrel								Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.33	**1.34**	0.00	0.01	0.39	**1.56**	0.01	0.02	0.04	0.18	0.00	0.01	0.05	0.21	0.01	0.04
Cadmium	0.04	0.14	0.00	0.01	**5.33**	**21.3**	0.36	**1.45**	0.01	0.02	0.00	0.01	0.03	0.12	0.03	0.10
Chromium	0.42	**2.11**	0.01	0.05	**1.20**	**6.01**	0.19	0.95	0.06	0.28	0.01	0.07	0.06	0.31	0.02	0.10
Cobalt	0.02	0.03	0.00	0.01	0.02	0.05	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Copper	0.08	0.10	0.00	0.00	0.34	0.42	0.08	0.09	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01
Lead	0.18	**1.79**	0.00	0.04	**1.28**	**12.8**	0.20	**1.95**	0.02	0.24	0.00	0.04	0.03	0.25	0.01	0.06
Manganese	0.02	0.19	0.00	0.01	0.02	0.22	0.00	0.02	0.00	0.03	0.00	0.01	0.01	0.06	0.00	0.04
Molybdenum	0.03	0.29	0.00	0.01	0.10	0.95	0.02	0.20	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.02	0.03	0.00	0.00	0.07	0.10	0.02	0.03	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Selenium	**3.59**	**7.19**	0.02	0.03	**18.2**	**36.4**	0.61	**1.22**	0.48	0.96	0.02	0.04	0.48	0.96	0.02	0.05
Thallium	0.07	0.66	0.00	0.01	0.09	0.85	0.00	0.04	0.01	0.09	0.00	0.01	0.01	0.10	0.00	0.03
Uranium	0.01	0.12	0.00	0.02	0.03	0.34	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.04	0.37	0.00	0.01	0.04	0.39	0.00	0.01	0.00	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.06	**1.23**	0.00	0.06	**2.12**	**45.2**	0.26	**5.54**	0.01	0.20	0.00	0.05	0.02	0.35	0.01	0.20

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.17	0.67	0.01	0.04	0.21	0.83	0.04	0.16
Cadmium	0.02	0.09	0.00	0.01	0.17	0.66	0.12	0.49
Chromium	0.21	**1.06**	0.04	0.20	0.28	**1.42**	0.10	0.49
Cobalt	0.02	0.03	0.01	0.02	0.02	0.04	0.01	0.02
Copper	0.04	0.05	0.01	0.01	0.30	0.37	0.22	0.27
Lead	0.09	0.90	0.01	0.13	0.12	**1.21**	0.04	0.38
Manganese	0.01	0.12	0.00	0.03	0.02	0.24	0.01	0.12
Molybdenum	0.01	0.14	0.00	0.03	N/A	N/A	N/A	N/A
Nickel	0.02	0.02	0.01	0.01	0.03	0.04	0.02	0.02
Selenium	**1.82**	**3.64**	0.06	0.12	**1.87**	**3.74**	0.10	0.21
Thallium	0.03	0.33	0.00	0.04	0.05	0.49	0.02	0.17
Uranium	0.01	0.10	0.00	0.03	0.01	0.11	0.00	0.04
Vanadium	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.03	0.73	0.01	0.13	0.14	**2.95**	0.09	**1.95**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 5. Summary of Hazard Quotient Calculations (Mammals)
AOI: Northeast PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.19	0.00	0.01	0.61	**3.06**	0.16	0.79	0.25	**1.25**	0.05	0.27
Cadmium	0.00	0.03	0.00	0.00	0.51	**5.05**	0.27	**2.67**	0.22	**2.18**	0.11	**1.15**
Chromium	0.00	0.04	0.00	0.01	0.09	0.85	0.01	0.07	0.04	0.36	0.00	0.02
Cobalt	0.01	0.02	0.00	0.01	0.22	0.89	0.01	0.04	0.10	0.38	0.00	0.01
Copper	0.01	0.01	0.00	0.00	0.95	**1.39**	0.05	0.07	0.41	0.60	0.02	0.03
Lead	0.00	0.02	0.00	0.01	0.14	**1.39**	0.00	0.04	0.06	0.60	0.00	0.01
Manganese	0.07	0.23	0.01	0.03	**1.60**	**5.17**	0.73	**2.35**	0.67	**2.17**	0.29	0.95
Molybdenum	0.01	0.06	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.18	0.34	0.04	0.07	0.08	0.14	0.02	0.03
Selenium	0.00	0.03	0.00	0.01	0.58	**5.81**	0.06	0.61	0.25	**2.51**	0.03	0.26
Thallium	0.00	0.03	0.00	0.01	0.16	**1.59**	0.02	0.22	0.07	0.68	0.01	0.09
Uranium	0.03	0.30	0.01	0.05	**50.7**	**507**	0.28	**2.83**	**21.9**	**219**	0.12	**1.15**
Vanadium	0.17	**1.69**	0.04	0.41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.01	0.19	**1.93**	0.06	0.56	0.08	0.82	0.02	0.23

	White-tailed Deer								Coyote							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.16	0.80	0.00	0.00	0.19	0.95	0.01	0.05	0.01	0.05	0.00	0.00	0.03	0.16	0.00	0.00
Cadmium	0.01	0.12	0.00	0.00	0.08	0.76	0.02	0.20	0.00	0.01	0.00	0.00	**1.46**	**14.6**	0.19	**1.93**
Chromium	0.02	0.16	0.00	0.00	0.02	0.17	0.00	0.01	0.00	0.01	0.00	0.00	0.03	0.26	0.00	0.05
Cobalt	0.02	0.10	0.00	0.00	0.02	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.04	0.00	0.01
Copper	0.03	0.04	0.00	0.00	0.04	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.08	0.11	0.01	0.02
Lead	0.01	0.10	0.00	0.00	0.01	0.11	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.55	0.01	0.10
Manganese	0.26	0.84	0.00	0.01	0.42	**1.36**	0.05	0.17	0.02	0.06	0.00	0.01	0.05	0.17	0.01	0.02
Molybdenum	0.03	0.25	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	0.05	0.52	0.01	0.07
Nickel	0.02	0.04	0.00	0.00	0.03	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.07	0.01	0.01
Selenium	0.01	0.12	0.00	0.01	0.03	0.26	0.00	0.05	0.00	0.01	0.00	0.00	0.04	0.37	0.01	0.12
Thallium	0.01	0.09	0.00	0.00	0.01	0.14	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01
Uranium	0.11	**1.09**	0.00	0.02	0.17	**1.70**	0.02	0.22	0.01	0.07	0.00	0.02	0.19	**1.92**	0.03	0.28
Vanadium	0.72	**7.17**	0.02	0.18	N/A	N/A	N/A	N/A	0.04	0.41	0.01	0.08	0.07	0.69	0.01	0.13
Zinc	0.02	0.17	0.00	0.00	0.03	0.29	0.00	0.04	0.00	0.01	0.00	0.00	0.51	**5.09**	0.07	0.70

	Bobcat								Deer Mouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.06	0.00	0.00	0.04	0.21	0.00	0.00	0.57	**2.87**	0.01	0.03	0.76	**3.81**	0.06	0.32
Cadmium	0.00	0.01	0.00	0.00	**1.92**	**19.2**	0.21	**2.05**	0.04	0.39	0.00	0.03	0.47	**4.69**	0.13	**1.35**
Chromium	0.00	0.01	0.00	0.00	0.03	0.34	0.00	0.05	0.06	0.56	0.01	0.05	0.07	0.69	0.01	0.09
Cobalt	0.00	0.01	0.00	0.00	0.01	0.05	0.00	0.01	0.09	0.34	0.01	0.04	0.11	0.42	0.02	0.06
Copper	0.00	0.00	0.00	0.00	0.10	0.15	0.01	0.02	0.10	0.14	0.01	0.01	0.61	0.88	0.16	0.24
Lead	0.00	0.01	0.00	0.00	0.07	0.72	0.01	0.10	0.04	0.37	0.00	0.03	0.05	0.49	0.01	0.07
Manganese	0.02	0.07	0.00	0.01	0.07	0.22	0.01	0.02	0.83	**2.68**	0.05	0.17	**1.67**	**5.38**	0.31	**1.00**
Molybdenum	0.00	0.02	0.00	0.00	0.07	0.69	0.01	0.08	0.09	0.91	0.01	0.07	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.05	0.09	0.01	0.01	0.06	0.11	0.01	0.01	0.11	0.20	0.02	0.04
Selenium	0.00	0.01	0.00	0.00	0.05	0.48	0.01	0.12	0.04	0.38	0.01	0.06	0.39	**3.86**	0.11	**1.13**
Thallium	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.03	0.30	0.00	0.04	0.08	0.84	0.02	0.20
Uranium	0.01	0.09	0.00	0.02	0.25	**2.52**	0.03	0.29	0.34	**3.43**	0.03	0.25	0.98	**9.83**	0.22	**2.21**
Vanadium	0.05	0.54	0.01	0.08	0.09	0.90	0.01	0.14	**2.57**	**25.7**	0.25	**2.51**	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	0.67	**6.70**	0.07	0.74	0.06	0.57	0.00	0.04	0.27	**2.74**	0.07	0.70

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.61	**3.10**	0.01	0.07	**11.0**	**55.3**	0.26	**1.29**
Cadmium	0.04	0.42	0.01	0.06	**141**	**1410**	**18.6**	**186**
Chromium	0.06	0.60	0.01	0.11	**12.5**	**125**	**2.23**	**22.3**
Cobalt	0.09	0.37	0.02	0.08	0.63	**2.52**	0.14	0.55
Copper	0.11	0.16	0.02	0.03	**10.8**	**15.7**	**1.82**	**2.65**
Lead	0.04	0.40	0.01	0.07	**165**	**1650**	**28.7**	**287**
Manganese	0.92	**2.96**	0.11	0.36	**4.53**	**14.6**	0.58	**1.88**
Molybdenum	0.10	0.99	0.01	0.14	**3.85**	**38.5**	0.55	**5.46**
Nickel	0.07	0.12	0.01	0.02	**8.64**	**15.8**	**1.64**	**3.00**
Selenium	0.04	0.41	0.01	0.13	**10.0**	**100**	**3.11**	**31.1**
Thallium	0.03	0.33	0.01	0.08	0.61	**6.10**	0.14	**1.39**
Uranium	0.38	**3.78**	0.06	0.56	0.79	**7.90**	0.11	**1.14**
Vanadium	**2.77**	**27.7**	0.53	**5.32**	**7.20**	**72.0**	**1.39**	**13.9**
Zinc	0.06	0.62	0.01	0.08	**54.5**	**545**	**7.46**	**74.6**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 6. Summary of Hazard Quotient Calculations (Birds)
AOI: Northeast PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.03	0.00	0.00	0.07	0.29	0.06	0.24
Cadmium	0.00	0.00	0.00	0.00	0.27	**1.07**	0.25	0.99
Chromium	0.02	0.09	0.00	0.01	0.33	**1.63**	0.29	**1.43**
Cobalt	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04
Copper	0.00	0.00	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**
Lead	0.01	0.06	0.00	0.01	0.17	**1.69**	0.15	**1.51**
Manganese	0.00	0.01	0.00	0.00	0.01	0.09	0.01	0.07
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.26	0.53	0.24	0.48
Thallium	0.00	0.01	0.00	0.00	0.06	0.59	0.05	0.54
Uranium	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Vanadium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.00	0.48	**10.2**	0.44	**9.33**

	Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.14	0.00	0.01	0.08	0.34	0.04	0.17
Cadmium	0.00	0.02	0.00	0.00	0.17	0.70	0.14	0.56
Chromium	0.09	0.47	0.04	0.20	0.13	0.66	0.07	0.35
Cobalt	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01
Copper	0.02	0.02	0.01	0.01	0.06	0.07	0.04	0.05
Lead	0.03	0.29	0.01	0.12	0.04	0.38	0.02	0.19
Manganese	0.00	0.04	0.00	0.01	0.02	0.21	0.02	0.15
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.03
Thallium	0.00	0.03	0.00	0.02	0.01	0.14	0.01	0.11
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Vanadium	0.01	0.07	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.01	0.19	0.00	0.06	0.06	**1.23**	0.04	0.92

	American Robin							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.03	0.12	0.00	0.01	0.26	**1.05**	0.01	0.06
Cadmium	0.00	0.01	0.00	0.00	**5.07**	**20.3**	**1.54**	**6.15**
Chromium	0.08	0.39	0.03	0.16	**7.61**	**38.1**	**3.12**	**15.6**
Cobalt	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.02
Copper	0.01	0.02	0.00	0.01	0.62	0.76	0.24	0.30
Lead	0.02	0.24	0.01	0.10	**46.8**	**468**	**18.7**	**187**
Manganese	0.00	0.03	0.00	0.01	0.01	0.08	0.00	0.02
Molybdenum	0.00	0.01	0.00	0.00	0.01	0.11	0.00	0.04
Nickel	0.00	0.01	0.00	0.00	0.25	0.34	0.11	0.15
Selenium	0.00	0.00	0.00	0.00	0.17	0.33	0.12	0.24
Thallium	0.00	0.02	0.00	0.01	0.02	0.21	0.01	0.11
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.06	0.00	0.03	0.01	0.10	0.00	0.04
Zinc	0.01	0.15	0.00	0.05	**2.92**	**62.2**	0.92	**19.5**

	Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.07	0.26	0.00	0.00	0.08	0.31	0.00	0.00
Cadmium	0.01	0.03	0.00	0.00	**1.14**	**4.55**	0.15	0.61
Chromium	0.17	0.87	0.00	0.02	0.49	**2.47**	0.06	0.31
Cobalt	0.01	0.02	0.00	0.00	0.02	0.03	0.00	0.00
Copper	0.03	0.04	0.00	0.00	0.12	0.15	0.02	0.02
Lead	0.05	0.54	0.00	0.01	0.39	**3.86**	0.06	0.60
Manganese	0.01	0.06	0.00	0.00	0.01	0.07	0.00	0.00
Molybdenum	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00
Nickel	0.01	0.01	0.00	0.00	0.03	0.04	0.00	0.01
Selenium	0.00	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Thallium	0.01	0.05	0.00	0.00	0.01	0.06	0.00	0.01
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.01	0.13	0.00	0.00	0.01	0.14	0.00	0.00
Zinc	0.02	0.33	0.00	0.01	0.60	**12.8**	0.08	**1.74**

	American Kestrel							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.07	0.28	0.00	0.00	0.08	0.33	0.00	0.01
Cadmium	0.01	0.03	0.00	0.00	**1.22**	**4.87**	0.47	**1.88**
Chromium	0.19	0.93	0.01	0.05	0.53	**2.65**	0.19	0.96
Cobalt	0.01	0.02	0.00	0.00	0.02	0.03	0.00	0.01
Copper	0.03	0.04	0.00	0.00	0.13	0.16	0.05	0.06
Lead	0.06	0.58	0.00	0.03	0.41	**4.13**	0.19	**1.86**
Manganese	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.01
Molybdenum	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.01
Nickel	0.01	0.01	0.00	0.00	0.03	0.04	0.01	0.02
Selenium	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.03
Thallium	0.01	0.05	0.00	0.01	0.01	0.07	0.00	0.02
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.01	0.14	0.00	0.01	0.01	0.14	0.00	0.01
Zinc	0.02	0.36	0.00	0.02	0.65	**13.7**	0.25	**5.41**

	Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.04	0.00	0.00	0.02	0.07	0.01	0.03
Cadmium	0.00	0.00	0.00	0.00	0.03	0.11	0.03	0.10
Chromium	0.02	0.12	0.01	0.07	0.03	0.15	0.02	0.10
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Lead	0.01	0.08	0.00	0.04	0.01	0.09	0.01	0.06
Manganese	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.03
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Thallium	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.02
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.00	0.05	0.00	0.02	0.01	0.21	0.01	0.17

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.14	0.00	0.01	0.07	0.30	0.03	0.14
Cadmium	0.00	0.02	0.00	0.00	0.15	0.59	0.12	0.48
Chromium	0.09	0.47	0.04	0.20	0.17	0.83	0.10	0.49
Cobalt	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.01
Copper	0.02	0.02	0.01	0.01	0.27	0.33	0.21	0.26
Lead	0.03	0.29	0.01	0.12	0.06	0.60	0.04	0.37
Manganese	0.00	0.04	0.00	0.01	0.02	0.15	0.01	0.10
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.01	0.02
Selenium	0.00	0.00	0.00	0.00	0.05	0.11	0.04	0.09
Thallium	0.00	0.03	0.00	0.02	0.02	0.19	0.01	0.15
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Vanadium	0.01	0.07	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.01	0.19	0.00	0.06	0.11	**2.41**	0.09	**1.88**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
(green) HQ < 1.0
(red) HQ ≥ 1.0

Table R 7. Summary of Hazard Quotient Calculations (Mammals)
AOI: Southwest PIA, Soils (Using Water Concentrations from Central Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.02	0.00	0.01	0.57	**2.89**	0.12	0.63	0.25	**1.25**	0.05	0.27
Cadmium	0.01	0.08	0.00	0.03	0.51	**5.11**	0.27	**2.72**	0.22	**2.20**	0.12	**1.17**
Chromium	0.00	0.02	0.00	0.01	0.08	0.83	0.01	0.05	0.04	0.36	0.00	0.02
Cobalt	0.00	0.02	0.00	0.01	0.22	0.88	0.01	0.03	0.10	0.38	0.00	0.01
Copper	0.00	0.01	0.00	0.00	0.95	**1.38**	0.04	0.06	0.41	0.60	0.02	0.03
Lead	0.00	0.01	0.00	0.00	0.14	**1.38**	0.00	0.03	0.06	0.60	0.00	0.01
Manganese	0.12	0.39	0.05	0.15	**1.65**	**5.33**	0.78	**2.51**	0.71	**2.29**	0.33	**1.07**
Molybdenum	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.02	0.00	0.01	0.19	0.35	0.05	0.08	0.08	0.15	0.02	0.04
Selenium	0.02	0.22	0.00	0.02	0.60	**6.00**	0.08	0.80	0.25	**2.53**	0.03	0.27
Thallium	0.00	0.02	0.00	0.01	0.16	**1.58**	0.02	0.21	0.07	0.68	0.01	0.09
Uranium	0.07	0.66	0.01	0.15	**50.7**	**507**	0.32	**3.20**	**21.9**	**219**	0.12	**1.24**
Vanadium	0.09	0.94	0.03	0.30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.01	0.06	0.00	0.01	0.19	**1.95**	0.06	0.57	0.08	0.83	0.02	0.24

	White-tailed Deer							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.09	0.00	0.00	0.05	0.24	0.01	0.05
Cadmium	0.02	0.19	0.00	0.01	0.08	0.83	0.02	0.21
Chromium	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.00
Cobalt	0.01	0.06	0.00	0.00	0.02	0.06	0.00	0.00
Copper	0.01	0.02	0.00	0.00	0.02	0.04	0.00	0.01
Lead	0.01	0.06	0.00	0.00	0.01	0.07	0.00	0.00
Manganese	0.28	0.90	0.02	0.05	0.44	**1.42**	0.07	0.22
Molybdenum	0.03	0.29	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.03	0.05	0.00	0.00	0.04	0.07	0.00	0.01
Selenium	0.09	0.93	0.00	0.01	0.11	**1.07**	0.01	0.05
Thallium	0.01	0.07	0.00	0.00	0.01	0.12	0.00	0.02
Uranium	0.18	**1.83**	0.01	0.05	0.24	**2.45**	0.02	0.25
Vanadium	0.40	**4.02**	0.01	0.13	N/A	N/A	N/A	N/A
Zinc	0.02	0.16	0.00	0.00	0.03	0.29	0.00	0.04

	Coyote							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Cadmium	0.00	0.02	0.00	0.01	0.66	**6.58**	0.11	**1.09**
Chromium	0.00	0.00	0.00	0.00	0.01	0.12	0.00	0.03
Cobalt	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.04	0.05	0.01	0.01
Lead	0.00	0.00	0.00	0.00	0.03	0.33	0.01	0.08
Manganese	0.03	0.10	0.02	0.07	0.04	0.14	0.02	0.08
Molybdenum	0.00	0.02	0.00	0.00	0.06	0.59	0.01	0.09
Nickel	0.00	0.01	0.00	0.00	0.02	0.04	0.01	0.01
Selenium	0.01	0.05	0.00	0.01	0.33	**3.27**	0.03	0.26
Thallium	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01
Uranium	0.02	0.17	0.01	0.06	0.20	**2.04**	0.03	0.29
Vanadium	0.02	0.23	0.01	0.06	0.04	0.38	0.01	0.09
Zinc	0.00	0.02	0.00	0.00	0.26	**2.56**	0.06	0.58

	Bobcat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Cadmium	0.00	0.02	0.00	0.01	0.87	**8.66**	0.12	**1.16**
Chromium	0.00	0.01	0.00	0.00	0.02	0.16	0.00	0.03
Cobalt	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01
Copper	0.00	0.00	0.00	0.00	0.05	0.07	0.01	0.01
Lead	0.00	0.00	0.00	0.00	0.04	0.43	0.01	0.09
Manganese	0.03	0.11	0.02	0.07	0.05	0.16	0.03	0.08
Molybdenum	0.00	0.02	0.00	0.00	0.08	0.77	0.01	0.09
Nickel	0.00	0.01	0.00	0.00	0.03	0.05	0.01	0.01
Selenium	0.01	0.07	0.00	0.01	0.43	**4.30**	0.03	0.27
Thallium	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01
Uranium	0.02	0.20	0.01	0.07	0.27	**2.65**	0.03	0.31
Vanadium	0.03	0.30	0.01	0.06	0.05	0.50	0.01	0.10
Zinc	0.00	0.02	0.00	0.01	0.34	**3.37**	0.06	0.62

	Deer Mouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.31	0.01	0.03	0.25	**1.25**	0.06	0.32
Cadmium	0.03	0.27	0.00	0.04	0.46	**4.57**	0.14	**1.36**
Chromium	0.03	0.27	0.00	0.03	0.04	0.40	0.01	0.07
Cobalt	0.05	0.19	0.01	0.02	0.07	0.26	0.01	0.05
Copper	0.05	0.07	0.01	0.01	0.55	0.81	0.16	0.24
Lead	0.02	0.22	0.00	0.03	0.03	0.34	0.01	0.07
Manganese	0.40	**1.28**	0.07	0.22	**1.23**	**3.98**	0.32	**1.05**
Molybdenum	0.10	**1.03**	0.01	0.08	N/A	N/A	N/A	N/A
Nickel	0.05	0.08	0.01	0.01	0.10	0.17	0.02	0.04
Selenium	0.33	**3.31**	0.01	0.13	0.68	**6.79**	0.12	**1.20**
Thallium	0.02	0.25	0.00	0.03	0.08	0.79	0.02	0.19
Uranium	0.40	**3.98**	0.03	0.30	**1.04**	**10.4**	0.23	**2.26**
Vanadium	**1.44**	**14.4**	0.18	**1.79**	N/A	N/A	N/A	N/A
Zinc	0.03	0.34	0.00	0.04	0.25	**2.51**	0.07	0.70

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.07	0.34	0.01	0.07	**1.19**	**6.02**	0.26	**1.30**
Cadmium	0.04	0.36	0.01	0.12	**63.5**	**635**	**10.4**	**104**
Chromium	0.03	0.29	0.01	0.06	**5.99**	**59.9**	**1.32**	**13.2**
Cobalt	0.05	0.20	0.01	0.05	0.34	**1.34**	0.08	0.33
Copper	0.05	0.08	0.01	0.02	**5.15**	**7.50**	**1.30**	**1.89**
Lead	0.02	0.24	0.01	0.06	**98.0**	**980**	**25.4**	**254**
Manganese	0.54	**1.74**	0.22	0.70	**1.67**	**5.39**	0.52	**1.69**
Molybdenum	0.11	**1.11**	0.02	0.17	**4.34**	**43.4**	0.66	**6.57**
Nickel	0.06	0.11	0.02	0.04	**4.92**	**8.97**	**1.11**	**2.03**
Selenium	0.36	**3.57**	0.03	0.29	**89.4**	**894**	**7.01**	**70.1**
Thallium	0.03	0.27	0.01	0.06	0.52	**5.17**	0.12	**1.22**
Uranium	0.48	**4.77**	0.08	0.84	0.89	**8.93**	0.14	**1.36**
Vanadium	**1.55**	**15.5**	0.38	**3.78**	**4.05**	**40.5**	0.99	**9.86**
Zinc	0.04	0.41	0.01	0.10	**27.3**	**273**	**6.15**	**61.5**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 8. Summary of Hazard Quotient Calculations (Birds)
AOI: Southwest PIA, Soils (Using Water Concentrations from Central Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow								Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.00	0.00	0.00	0.07	0.26	0.06	0.24	0.00	0.02	0.00	0.01	0.05	0.21	0.04	0.17
Cadmium	0.00	0.02	0.00	0.01	0.27	**1.09**	0.25	**1.00**	0.01	0.02	0.00	0.01	0.18	0.70	0.14	0.57
Chromium	0.01	0.04	0.00	0.01	0.32	**1.58**	0.29	**1.43**	0.04	0.22	0.02	0.12	0.08	0.42	0.06	0.28
Cobalt	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Copper	0.00	0.00	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**	0.01	0.01	0.00	0.01	0.05	0.06	0.04	0.05
Lead	0.00	0.03	0.00	0.01	0.17	**1.67**	0.15	**1.51**	0.02	0.17	0.01	0.11	0.03	0.26	0.02	0.18
Manganese	0.00	0.02	0.00	0.02	0.01	0.10	0.01	0.09	0.00	0.03	0.00	0.02	0.02	0.21	0.02	0.16
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.02	0.03	0.02	0.03	0.01	0.01	0.00	0.01	0.02	0.03	0.02	0.03
Selenium	0.00	0.01	0.00	0.00	0.27	0.53	0.24	0.48	0.02	0.03	0.00	0.01	0.03	0.07	0.02	0.03
Thallium	0.00	0.00	0.00	0.00	0.06	0.59	0.05	0.54	0.00	0.02	0.00	0.01	0.01	0.14	0.01	0.11
Uranium	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Vanadium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.00	0.08	0.00	0.03	0.48	**10.2**	0.44	**9.35**	0.01	0.16	0.00	0.07	0.06	**1.21**	0.04	0.93

	American Robin								Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.01	0.00	0.01	0.03	0.11	0.01	0.06	0.01	0.03	0.00	0.00	0.01	0.03	0.00	0.00
Cadmium	0.00	0.02	0.00	0.01	**2.28**	**9.14**	0.86	**3.43**	0.00	0.02	0.00	0.00	0.51	**2.05**	0.09	0.34
Chromium	0.04	0.18	0.02	0.09	**3.64**	**18.2**	**1.85**	**9.24**	0.08	0.41	0.00	0.01	0.24	**1.18**	0.04	0.18
Cobalt	0.00	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.00	0.00
Copper	0.01	0.01	0.00	0.00	0.30	0.36	0.17	0.21	0.01	0.02	0.00	0.00	0.06	0.07	0.01	0.01
Lead	0.01	0.14	0.01	0.08	**27.8**	**278**	**16.5**	**165**	0.03	0.32	0.00	0.01	0.23	**2.29**	0.05	0.53
Manganese	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.01
Molybdenum	0.00	0.01	0.00	0.00	0.01	0.13	0.00	0.04	0.00	0.02	0.00	0.00	0.01	0.05	0.00	0.01
Nickel	0.00	0.01	0.00	0.00	0.14	0.20	0.07	0.10	0.01	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Selenium	0.01	0.03	0.00	0.00	**1.49**	**2.98**	0.27	0.54	0.03	0.06	0.00	0.00	0.14	0.29	0.01	0.02
Thallium	0.00	0.02	0.00	0.01	0.02	0.18	0.01	0.10	0.00	0.04	0.00	0.00	0.01	0.05	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.00	0.03	0.00	0.02	0.01	0.06	0.00	0.03	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.00
Zinc	0.01	0.12	0.00	0.05	**1.46**	**31.2**	0.76	**16.1**	0.01	0.18	0.00	0.01	0.30	**6.44**	0.07	**1.44**

	American Kestrel								Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.03	0.00	0.00	0.01	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.03
Cadmium	0.01	0.02	0.00	0.01	0.55	**2.20**	0.26	**1.06**	0.00	0.01	0.00	0.00	0.03	0.11	0.03	0.10
Chromium	0.09	0.44	0.01	0.03	0.25	**1.27**	0.11	0.57	0.01	0.06	0.01	0.04	0.02	0.09	0.01	0.07
Cobalt	0.01	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.02	0.02	0.00	0.00	0.06	0.08	0.04	0.05	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Lead	0.03	0.34	0.00	0.03	0.25	**2.45**	0.16	**1.64**	0.00	0.05	0.00	0.04	0.01	0.06	0.01	0.05
Manganese	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.03
Molybdenum	0.00	0.02	0.00	0.00	0.01	0.05	0.00	0.02	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Selenium	0.03	0.06	0.00	0.00	0.15	0.31	0.03	0.06	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Thallium	0.00	0.05	0.00	0.00	0.01	0.06	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.08	0.00	0.01	0.01	0.08	0.00	0.01	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.01	0.21	0.00	0.03	0.32	**6.91**	0.21	**4.47**	0.00	0.05	0.00	0.02	0.01	0.20	0.01	0.18

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.02	0.00	0.01	0.04	0.17	0.03	0.14
Cadmium	0.01	0.02	0.00	0.01	0.15	0.60	0.12	0.48
Chromium	0.04	0.22	0.02	0.12	0.12	0.58	0.08	0.41
Cobalt	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Copper	0.01	0.01	0.00	0.01	0.26	0.32	0.21	0.26
Lead	0.02	0.17	0.01	0.11	0.05	0.48	0.04	0.36
Manganese	0.00	0.03	0.00	0.02	0.02	0.15	0.01	0.12
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.01	0.02	0.03	0.02	0.02
Selenium	0.02	0.03	0.00	0.01	0.07	0.13	0.05	0.09
Thallium	0.00	0.02	0.00	0.01	0.02	0.18	0.01	0.14
Uranium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Vanadium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.16	0.00	0.07	0.11	**2.39**	0.09	**1.89**

AOI:	Area of interest
LOAEL:	Lowest observable adverse effect level
HQ:	Hazard quotient
NOAEL:	No observable adverse effect level
N/A:	Value could not be calculated with the information available
	HQ < 1.0
	HQ ≥ 1.0

Table R 9. Summary of Hazard Quotient Calculations (Mammals)
AOI: East Haul Road PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	0.07	0.34	0.00	0.02	0.64	**3.22**	0.19	0.95	0.25	**1.27**	0.06	0.29
Cadmium	0.00	0.03	0.00	0.01	0.51	**5.06**	0.27	**2.67**	0.22	**2.18**	0.11	**1.15**
Chromium	0.00	0.03	0.00	0.01	0.08	0.84	0.01	0.06	0.04	0.36	0.00	0.02
Cobalt	0.01	0.03	0.00	0.00	0.22	0.89	0.01	0.05	0.10	0.38	0.00	0.01
Copper	0.01	0.02	0.00	0.00	0.96	**1.40**	0.05	0.08	0.41	0.60	0.02	0.03
Lead	0.00	0.03	0.00	0.00	0.14	**1.39**	0.00	0.04	0.06	0.60	0.00	0.01
Manganese	0.05	0.16	0.01	0.03	**1.58**	**5.10**	0.71	**2.28**	0.67	**2.17**	0.29	0.94
Molybdenum	0.02	0.19	0.00	0.03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.19	0.34	0.04	0.08	0.08	0.14	0.02	0.03
Selenium	0.00	0.03	0.00	0.01	0.58	**5.81**	0.06	0.61	0.25	**2.52**	0.03	0.26
Thallium	0.00	0.03	0.00	0.01	0.16	**1.59**	0.02	0.23	0.07	0.69	0.01	0.09
Uranium	0.13	**1.34**	0.02	0.20	**50.8**	**508**	0.39	**3.87**	**21.9**	**219**	0.13	**1.29**
Vanadium	0.14	**1.39**	0.03	0.35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.01	0.19	**1.92**	0.05	0.55	0.08	0.82	0.02	0.23

	White-tailed Deer								Coyote							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	0.29	**1.47**	0.00	0.01	0.32	**1.62**	0.01	0.06	0.02	0.08	0.00	0.00	0.06	0.29	0.00	0.02
Cadmium	0.01	0.12	0.00	0.00	0.08	0.77	0.02	0.20	0.00	0.01	0.00	0.00	**1.57**	**15.7**	0.22	**2.17**
Chromium	0.01	0.11	0.00	0.00	0.01	0.12	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.19	0.00	0.04
Cobalt	0.03	0.12	0.00	0.00	0.03	0.12	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.05	0.00	0.01
Copper	0.05	0.07	0.00	0.00	0.06	0.09	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.21	0.02	0.02
Lead	0.01	0.11	0.00	0.00	0.01	0.11	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.59	0.01	0.09
Manganese	0.17	0.54	0.00	0.01	0.33	**1.06**	0.05	0.17	0.01	0.04	0.00	0.00	0.03	0.11	0.01	0.02
Molybdenum	0.08	0.80	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.05	0.00	0.01	0.16	**1.63**	0.02	0.21
Nickel	0.03	0.05	0.00	0.00	0.03	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.09	0.01	0.01
Selenium	0.01	0.13	0.00	0.01	0.03	0.27	0.00	0.05	0.00	0.01	0.00	0.00	0.04	0.41	0.01	0.13
Thallium	0.01	0.11	0.00	0.00	0.02	0.16	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01
Uranium	0.55	**5.52**	0.01	0.08	0.61	**6.14**	0.03	0.28	0.03	0.33	0.00	0.04	**1.10**	**11.0**	0.12	**1.25**
Vanadium	0.59	**5.92**	0.01	0.15	N/A	N/A	N/A	N/A	0.03	0.34	0.01	0.07	0.06	0.57	0.01	0.11
Zinc	0.01	0.13	0.00	0.00	0.03	0.26	0.00	0.04	0.00	0.01	0.00	0.00	0.40	**3.97**	0.07	0.72

	Bobcat								Deer Mouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	0.02	0.11	0.00	0.01	0.08	0.38	0.00	0.02	**1.04**	**5.25**	0.03	0.15	**1.23**	**6.19**	0.09	0.44
Cadmium	0.00	0.01	0.00	0.00	**2.06**	**20.6**	0.23	**2.30**	0.04	0.41	0.00	0.03	0.47	**4.72**	0.13	**1.35**
Chromium	0.00	0.01	0.00	0.00	0.02	0.25	0.00	0.04	0.04	0.41	0.00	0.04	0.05	0.54	0.01	0.08
Cobalt	0.00	0.01	0.00	0.00	0.02	0.06	0.00	0.01	0.11	0.42	0.01	0.03	0.13	0.50	0.01	0.05
Copper	0.00	0.01	0.00	0.00	0.19	0.27	0.02	0.02	0.18	0.26	0.01	0.01	0.69	**1.00**	0.16	0.24
Lead	0.00	0.01	0.00	0.00	0.08	0.77	0.01	0.09	0.04	0.39	0.00	0.03	0.05	0.52	0.01	0.07
Manganese	0.02	0.05	0.00	0.01	0.04	0.14	0.01	0.02	0.49	**1.60**	0.05	0.15	**1.33**	**4.30**	0.30	0.98
Molybdenum	0.01	0.06	0.00	0.01	0.21	**2.15**	0.02	0.22	0.29	**2.86**	0.02	0.18	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.06	0.12	0.01	0.01	0.08	0.14	0.01	0.01	0.13	0.23	0.02	0.04
Selenium	0.00	0.01	0.00	0.00	0.05	0.54	0.01	0.14	0.04	0.42	0.01	0.07	0.39	**3.90**	0.11	**1.13**
Thallium	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.04	0.38	0.00	0.04	0.09	0.91	0.02	0.21
Uranium	0.04	0.43	0.00	0.04	**1.45**	**14.5**	0.13	**1.32**	**1.93**	**19.3**	0.11	**1.11**	**2.57**	**25.7**	0.31	**3.07**
Vanadium	0.04	0.45	0.01	0.07	0.07	0.74	0.01	0.12	**2.12**	**21.2**	0.21	**2.10**	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	0.52	**5.22**	0.08	0.76	0.04	0.44	0.00	0.04	0.26	**2.61**	0.07	0.71

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Arsenic	**1.12**	**5.66**	0.06	0.31	**20.1**	**101**	**1.10**	**5.56**
Cadmium	0.05	0.45	0.01	0.06	**152**	**1516**	**20.9**	**209**
Chromium	0.04	0.44	0.01	0.08	**9.13**	**91.3**	**1.71**	**17.1**
Cobalt	0.11	0.45	0.02	0.06	0.78	**3.11**	0.11	0.44
Copper	0.19	0.28	0.02	0.03	**19.5**	**28.4**	**2.08**	**3.04**
Lead	0.04	0.42	0.01	0.06	**176**	**1759**	**25.8**	**258**
Manganese	0.55	**1.79**	0.10	0.33	**2.66**	**8.58**	0.52	**1.68**
Molybdenum	0.31	**3.08**	0.04	0.39	**12.0**	**120**	**1.52**	**15.2**
Nickel	0.09	0.16	0.01	0.02	**11.4**	**20.8**	**1.56**	**2.83**
Selenium	0.05	0.46	0.01	0.15	**11.2**	**112**	**3.47**	**34.7**
Thallium	0.04	0.41	0.01	0.09	0.76	**7.62**	0.16	**1.58**
Uranium	**2.09**	**20.9**	0.24	**2.38**	**4.47**	**44.7**	0.51	**5.05**
Vanadium	**2.28**	**22.8**	0.44	**4.44**	**5.94**	**59.4**	**1.16**	**11.6**
Zinc	0.05	0.48	0.01	0.08	**42.4**	**424**	**7.64**	**76.4**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 10. Summary of Hazard Quotient Calculations (Birds)
AOI: East Haul Road PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow								Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.05	0.00	0.00	0.08	0.31	0.06	0.24	0.06	0.26	0.01	0.03	0.11	0.45	0.05	0.19
Cadmium	0.00	0.00	0.00	0.00	0.27	**1.07**	0.25	0.99	0.00	0.02	0.00	0.01	0.17	0.70	0.14	0.56
Chromium	0.01	0.07	0.00	0.01	0.32	**1.61**	0.29	**1.43**	0.07	0.34	0.03	0.15	0.11	0.54	0.06	0.31
Cobalt	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04	0.01	0.01	0.00	0.00	0.01	0.02	0.00	0.01
Copper	0.01	0.01	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**	0.03	0.04	0.01	0.01	0.07	0.09	0.04	0.05
Lead	0.01	0.06	0.00	0.01	0.17	**1.69**	0.15	**1.51**	0.03	0.31	0.01	0.11	0.04	0.40	0.02	0.18
Manganese	0.00	0.01	0.00	0.00	0.01	0.08	0.01	0.07	0.00	0.02	0.00	0.01	0.02	0.20	0.01	0.15
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.26	0.53	0.24	0.48	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.03
Thallium	0.00	0.01	0.00	0.00	0.06	0.59	0.05	0.54	0.00	0.04	0.00	0.02	0.02	0.15	0.01	0.11
Uranium	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01
Vanadium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.06	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.48	**10.2**	0.44	**9.33**	0.01	0.15	0.00	0.06	0.06	**1.20**	0.04	0.92

	American Robin								Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.05	0.21	0.01	0.03	0.48	**1.91**	0.06	0.24	0.12	0.48	0.00	0.00	0.14	0.56	0.00	0.01
Cadmium	0.00	0.01	0.00	0.00	**5.45**	**21.8**	**1.72**	**6.89**	0.01	0.03	0.00	0.00	**1.22**	**4.89**	0.17	0.68
Chromium	0.06	0.28	0.02	0.12	**5.54**	**27.7**	**2.39**	**12.0**	0.13	0.63	0.00	0.01	0.36	**1.80**	0.05	0.24
Cobalt	0.01	0.01	0.00	0.00	0.02	0.04	0.01	0.01	0.01	0.02	0.00	0.00	0.02	0.04	0.00	0.00
Copper	0.02	0.03	0.01	0.01	**1.12**	**1.38**	0.27	0.34	0.05	0.06	0.00	0.00	0.22	0.27	0.02	0.02
Lead	0.03	0.25	0.01	0.09	**49.9**	**499**	**16.8**	**168**	0.06	0.57	0.00	0.01	0.41	**4.11**	0.05	0.54
Manganese	0.00	0.02	0.00	0.01	0.00	0.05	0.00	0.02	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.00
Molybdenum	0.00	0.02	0.00	0.01	0.04	0.35	0.01	0.10	0.00	0.04	0.00	0.00	0.01	0.14	0.00	0.01
Nickel	0.01	0.01	0.00	0.00	0.33	0.45	0.10	0.14	0.01	0.02	0.00	0.00	0.04	0.05	0.00	0.01
Selenium	0.00	0.00	0.00	0.00	0.19	0.37	0.13	0.27	0.00	0.01	0.00	0.00	0.02	0.04	0.00	0.01
Thallium	0.00	0.03	0.00	0.01	0.03	0.27	0.01	0.13	0.01	0.06	0.00	0.00	0.01	0.08	0.00	0.01
Uranium	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.05	0.00	0.00
Vanadium	0.00	0.05	0.00	0.02	0.01	0.08	0.00	0.04	0.01	0.11	0.00	0.00	0.01	0.11	0.00	0.00
Zinc	0.01	0.12	0.00	0.05	**2.27**	**48.4**	0.94	**20.0**	0.01	0.26	0.00	0.01	0.47	**10.0**	0.08	**1.78**

	American Kestrel								Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.13	0.52	0.00	0.01	0.15	0.60	0.01	0.02	0.02	0.07	0.00	0.01	0.02	0.10	0.01	0.04
Cadmium	0.01	0.03	0.00	0.00	**1.31**	**5.24**	0.53	**2.11**	0.00	0.00	0.00	0.00	0.03	0.11	0.03	0.10
Chromium	0.14	0.68	0.01	0.04	0.39	**1.93**	0.15	0.74	0.02	0.09	0.01	0.05	0.02	0.12	0.02	0.08
Cobalt	0.01	0.03	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.06	0.07	0.00	0.00	0.24	0.29	0.06	0.07	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01
Lead	0.06	0.61	0.00	0.03	0.44	**4.40**	0.17	**1.67**	0.01	0.08	0.00	0.04	0.01	0.09	0.01	0.05
Manganese	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03
Molybdenum	0.00	0.04	0.00	0.00	0.01	0.15	0.00	0.04	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.02	0.00	0.00	0.04	0.06	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Selenium	0.00	0.01	0.00	0.00	0.02	0.04	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Thallium	0.01	0.07	0.00	0.01	0.01	0.09	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.02
Uranium	0.00	0.02	0.00	0.00	0.01	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.11	0.00	0.01	0.01	0.12	0.00	0.01	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.01	0.28	0.00	0.02	0.50	**10.7**	0.26	**5.54**	0.00	0.04	0.00	0.02	0.01	0.19	0.01	0.17

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.06	0.26	0.01	0.03	0.10	0.42	0.04	0.16
Cadmium	0.00	0.02	0.00	0.01	0.15	0.59	0.12	0.48
Chromium	0.07	0.34	0.03	0.15	0.14	0.70	0.09	0.44
Cobalt	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01
Copper	0.03	0.04	0.01	0.01	0.28	0.35	0.22	0.27
Lead	0.03	0.31	0.01	0.11	0.06	0.62	0.04	0.36
Manganese	0.00	0.02	0.00	0.01	0.01	0.14	0.01	0.10
Molybdenum	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.01	0.01	0.00	0.00	0.02	0.03	0.01	0.02
Selenium	0.00	0.00	0.00	0.00	0.05	0.11	0.04	0.09
Thallium	0.00	0.04	0.00	0.02	0.02	0.20	0.02	0.15
Uranium	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01
Vanadium	0.01	0.06	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.01	0.15	0.00	0.06	0.11	**2.37**	0.09	**1.88**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 11. Summary of Hazard Quotient Calculations (Mammals)
AOI: West Haul Road PIA, Soils (Using Water Concentrations from Western Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.11	0.00	0.02	0.59	**2.99**	0.14	0.72	0.25	**1.26**	0.06	0.28
Cadmium	0.00	0.03	0.00	0.01	0.51	**5.05**	0.27	**2.67**	0.22	**2.18**	0.11	**1.15**
Chromium	0.00	0.02	0.00	0.01	0.08	0.83	0.01	0.05	0.04	0.36	0.00	0.02
Cobalt	0.00	0.01	0.00	0.00	0.22	0.88	0.01	0.03	0.09	0.38	0.00	0.01
Copper	0.01	0.02	0.00	0.00	0.96	**1.40**	0.05	0.08	0.41	0.60	0.02	0.03
Lead	0.00	0.01	0.00	0.01	0.14	**1.38**	0.00	0.03	0.06	0.60	0.00	0.01
Manganese	0.05	0.15	0.01	0.04	**1.58**	**5.10**	0.70	**2.28**	0.68	**2.18**	0.30	0.96
Molybdenum	0.03	0.28	0.00	0.04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.18	0.33	0.04	0.07	0.08	0.14	0.02	0.03
Selenium	0.00	0.04	0.00	0.02	0.58	**5.81**	0.06	0.61	0.25	**2.52**	0.03	0.27
Thallium	0.00	0.05	0.00	0.01	0.16	**1.61**	0.02	0.24	0.07	0.69	0.01	0.09
Uranium	0.38	**3.78**	0.06	0.56	**51.0**	**510**	0.63	**6.31**	**22.0**	**220**	0.17	**1.66**
Vanadium	0.10	0.96	0.03	0.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.01	0.19	**1.92**	0.05	0.55	0.08	0.83	0.02	0.23

	White-tailed Deer								Coyote							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.09	0.48	0.00	0.01	0.12	0.62	0.01	0.05	0.01	0.03	0.00	0.00	0.02	0.09	0.00	0.01
Cadmium	0.01	0.11	0.00	0.00	0.08	0.75	0.02	0.20	0.00	0.01	0.00	0.00	**1.31**	**13.13**	0.17	**1.72**
Chromium	0.01	0.08	0.00	0.00	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.00	0.03
Cobalt	0.01	0.05	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01
Copper	0.05	0.07	0.00	0.00	0.06	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.13	0.18	0.02	0.02
Lead	0.01	0.06	0.00	0.00	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.33	0.01	0.09
Manganese	0.16	0.52	0.01	0.02	0.32	**1.04**	0.06	0.18	0.01	0.04	0.00	0.01	0.03	0.10	0.01	0.03
Molybdenum	0.12	**1.18**	0.00	0.02	N/A	N/A	N/A	N/A	0.01	0.07	0.00	0.01	0.24	**2.41**	0.03	0.27
Nickel	0.01	0.03	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.04	0.01	0.01
Selenium	0.01	0.13	0.00	0.01	0.03	0.27	0.01	0.05	0.00	0.01	0.00	0.00	0.04	0.37	0.01	0.12
Thallium	0.02	0.20	0.00	0.00	0.03	0.25	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.06	0.00	0.01
Uranium	**1.60**	**16.0**	0.02	0.24	**1.66**	**16.6**	0.04	0.43	0.09	0.93	0.01	0.12	**3.25**	**32.5**	0.36	**3.64**
Vanadium	0.41	**4.08**	0.01	0.13	N/A	N/A	N/A	N/A	0.02	0.23	0.01	0.06	0.04	0.39	0.01	0.10
Zinc	0.01	0.12	0.00	0.00	0.02	0.25	0.00	0.04	0.00	0.01	0.00	0.00	0.36	**3.55**	0.08	0.76

	Bobcat								Deer Mouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.04	0.00	0.00	0.02	0.12	0.00	0.01	0.34	**1.71**	0.02	0.11	0.52	**2.65**	0.08	0.39
Cadmium	0.00	0.01	0.00	0.00	**1.73**	**17.3**	0.18	**1.83**	0.03	**0.35**	0.00	0.02	0.47	**4.65**	0.13	**1.34**
Chromium	0.00	0.01	0.00	0.00	0.02	0.16	0.00	0.03	0.03	**0.27**	0.00	0.03	0.04	0.40	0.01	0.07
Cobalt	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.04	**0.16**	0.01	0.02	0.06	0.24	0.01	0.05
Copper	0.00	0.01	0.00	0.00	0.17	0.24	0.02	0.02	0.16	**0.23**	0.01	0.02	0.67	0.97	0.17	0.24
Lead	0.00	0.00	0.00	0.00	0.04	0.43	0.01	0.10	0.02	**0.22**	0.00	0.03	0.03	0.34	0.01	0.07
Manganese	0.01	0.05	0.00	0.01	0.04	0.13	0.01	0.03	0.47	**1.52**	0.05	0.17	**1.31**	**4.22**	0.31	**1.00**
Molybdenum	0.01	0.09	0.00	0.01	0.32	**3.18**	0.03	0.29	0.42	**4.23**	0.02	0.24	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.03	0.05	0.01	0.01	0.03	**0.06**	0.00	0.01	0.08	0.15	0.02	0.04
Selenium	0.00	0.01	0.00	0.01	0.05	0.48	0.01	0.12	0.04	**0.39**	0.01	0.06	0.39	**3.87**	0.11	**1.13**
Thallium	0.00	0.02	0.00	0.00	0.01	0.08	0.00	0.01	0.07	**0.72**	0.01	0.06	0.13	**1.26**	0.02	0.22
Uranium	0.12	**1.21**	0.01	0.12	**4.28**	**42.8**	0.39	**3.86**	**5.70**	**57.0**	0.32	**3.24**	**6.34**	**63.4**	0.52	**5.20**
Vanadium	0.03	0.31	0.01	0.06	0.05	0.51	0.01	0.11	**1.46**	**14.6**	0.19	**1.90**	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	0.47	**4.68**	0.08	0.81	0.04	**0.40**	0.00	0.04	0.26	**2.57**	0.07	0.71

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.36	**1.84**	0.04	0.22	**6.51**	**32.8**	0.79	**3.98**
Cadmium	0.04	0.38	0.01	0.05	**127**	**1269**	**16.6**	**166**
Chromium	0.03	0.29	0.01	0.07	**6.03**	**60.3**	**1.40**	**14.0**
Cobalt	0.04	0.17	0.01	0.05	0.30	**1.19**	0.08	0.32
Copper	0.17	0.25	0.02	0.03	**17.4**	**25.4**	**2.19**	**3.20**
Lead	0.02	0.24	0.01	0.06	**99.2**	**992**	**26.9**	**269**
Manganese	0.53	**1.70**	0.12	0.38	**2.52**	**8.15**	0.54	**1.75**
Molybdenum	0.46	**4.56**	0.05	0.51	**17.8**	**178**	**1.99**	**19.9**
Nickel	0.04	0.07	0.01	0.02	**4.70**	**8.57**	**1.11**	**2.02**
Selenium	0.04	0.43	0.01	0.14	**10.0**	**100**	**3.11**	**31.1**
Thallium	0.08	0.78	0.01	0.12	**1.49**	**14.9**	0.23	**2.27**
Uranium	**6.15**	**61.5**	0.69	**6.89**	**13.2**	**132**	**1.47**	**14.7**
Vanadium	**1.58**	**15.8**	0.40	**4.01**	**4.11**	**41.1**	**1.05**	**10.5**
Zinc	0.04	0.44	0.01	0.10	**38.0**	**380**	**8.09**	**80.9**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 12. Summary of Hazard Quotient Calculations (Birds)
AOI: West Haul Road PIA, Soils (Using Water Concentrations from Western Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.00	0.02	0.00	0.00	0.07	0.27	0.06	0.24
Cadmium	0.00	0.00	0.00	0.00	0.27	**1.07**	0.25	0.99
Chromium	0.01	0.05	0.00	0.01	0.32	**1.58**	0.28	**1.42**
Cobalt	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04
Copper	0.01	0.01	0.00	0.00	**1.46**	**1.80**	**1.34**	**1.66**
Lead	0.00	0.03	0.00	0.01	0.17	**1.67**	0.15	**1.51**
Manganese	0.00	0.01	0.00	0.00	0.01	0.08	0.01	0.07
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.26	0.53	0.24	0.48
Thallium	0.00	0.01	0.00	0.00	0.06	0.60	0.05	0.54
Uranium	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.03
Vanadium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.01	0.48	**10.2**	0.44	**9.34**

	Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.08	0.01	0.02	0.07	0.28	0.05	0.18
Cadmium	0.00	0.02	0.00	0.00	0.17	0.70	0.14	0.56
Chromium	0.05	0.23	0.02	0.12	0.08	0.42	0.06	0.28
Cobalt	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
Copper	0.03	0.03	0.01	0.01	0.07	0.08	0.04	0.05
Lead	0.02	0.17	0.01	0.11	0.03	0.27	0.02	0.19
Manganese	0.00	0.02	0.00	0.01	0.02	0.19	0.02	0.15
Molybdenum	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.02	0.03	0.02	0.02
Selenium	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.03
Thallium	0.01	0.07	0.00	0.02	0.02	0.18	0.01	0.12
Uranium	0.00	0.03	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.14	0.00	0.07	0.06	**1.18**	0.04	0.93

	American Robin							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.07	0.00	0.02	0.16	0.62	0.04	0.17
Cadmium	0.00	0.01	0.00	0.00	**4.56**	**18.3**	**1.37**	**5.48**
Chromium	0.04	0.19	0.02	0.10	**3.66**	**18.3**	**1.95**	**9.74**
Cobalt	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01
Copper	0.02	0.03	0.01	0.01	**1.00**	**1.23**	0.29	0.36
Lead	0.01	0.14	0.01	0.09	**28.1**	**281**	**17.5**	**175**
Manganese	0.00	0.02	0.00	0.01	0.00	0.05	0.00	0.02
Molybdenum	0.00	0.03	0.00	0.01	0.05	0.52	0.01	0.13
Nickel	0.00	0.00	0.00	0.00	0.13	0.19	0.07	0.10
Selenium	0.00	0.00	0.00	0.00	0.17	0.33	0.12	0.24
Thallium	0.01	0.05	0.00	0.02	0.05	0.52	0.02	0.18
Uranium	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.01
Vanadium	0.00	0.03	0.00	0.02	0.01	0.06	0.00	0.03
Zinc	0.01	0.11	0.00	0.05	**2.04**	**43.4**	**1.00**	**21.2**

	Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.16	0.00	0.00	0.05	0.18	0.00	0.01
Cadmium	0.01	0.03	0.00	0.00	**1.02**	**4.10**	0.14	0.54
Chromium	0.08	0.42	0.00	0.01	0.24	**1.19**	0.04	0.19
Cobalt	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00
Copper	0.05	0.06	0.00	0.00	0.20	0.25	0.02	0.02
Lead	0.03	0.32	0.00	0.01	0.23	**2.32**	0.06	0.56
Manganese	0.00	0.03	0.00	0.00	0.00	0.04	0.00	0.00
Molybdenum	0.01	0.06	0.00	0.00	0.02	0.21	0.00	0.02
Nickel	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.00
Selenium	0.00	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Thallium	0.01	0.12	0.00	0.00	0.02	0.16	0.00	0.01
Uranium	0.00	0.05	0.00	0.00	0.02	0.16	0.00	0.01
Vanadium	0.01	0.07	0.00	0.00	0.01	0.08	0.00	0.00
Zinc	0.01	0.23	0.00	0.01	0.42	**8.9**	0.09	**1.89**

	American Kestrel							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.04	0.17	0.00	0.01	0.05	0.20	0.00	0.02
Cadmium	0.01	0.03	0.00	0.00	**1.10**	**4.39**	0.42	**1.68**
Chromium	0.09	0.45	0.01	0.03	0.26	**1.28**	0.12	0.60
Cobalt	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00
Copper	0.05	0.06	0.00	0.00	0.21	0.26	0.06	0.08
Lead	0.03	0.35	0.00	0.03	0.25	**2.48**	0.17	**1.74**
Manganese	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.01
Molybdenum	0.01	0.07	0.00	0.00	0.02	0.22	0.01	0.05
Nickel	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01
Selenium	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.03
Thallium	0.01	0.13	0.00	0.01	0.02	0.17	0.00	0.02
Uranium	0.01	0.05	0.00	0.00	0.02	0.17	0.00	0.04
Vanadium	0.01	0.08	0.00	0.01	0.01	0.08	0.00	0.01
Zinc	0.01	0.25	0.00	0.02	0.45	**9.6**	0.28	**5.87**

	Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.01	0.02	0.00	0.01	0.01	0.05	0.01	0.04
Cadmium	0.00	0.00	0.00	0.00	0.03	0.11	0.03	0.10
Chromium	0.01	0.06	0.01	0.04	0.02	0.09	0.01	0.07
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01
Lead	0.00	0.05	0.00	0.04	0.01	0.06	0.01	0.05
Manganese	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03
Molybdenum	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Thallium	0.00	0.02	0.00	0.01	0.00	0.03	0.00	0.03
Uranium	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
Vanadium	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.00	0.04	0.00	0.02	0.01	0.19	0.01	0.18

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Arsenic	0.02	0.08	0.01	0.02	0.06	0.24	0.04	0.15
Cadmium	0.00	0.02	0.00	0.00	0.15	0.59	0.12	0.48
Chromium	0.05	0.23	0.02	0.12	0.12	0.58	0.08	0.42
Cobalt	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01
Copper	0.03	0.03	0.01	0.01	0.28	0.35	0.22	0.27
Lead	0.02	0.17	0.01	0.11	0.05	0.49	0.04	0.37
Manganese	0.00	0.02	0.00	0.01	0.01	0.14	0.01	0.11
Molybdenum	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.02	0.02	0.01	0.02
Selenium	0.00	0.00	0.00	0.00	0.05	0.11	0.04	0.09
Thallium	0.01	0.07	0.00	0.02	0.02	0.23	0.02	0.16
Uranium	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.01
Vanadium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.14	0.00	0.07	0.11	**2.36**	0.09	**1.89**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 13. Summary of Hazard Quotient Calculations
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

Raccoon

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative NOAEL HQ	Model 2 Representative LOAEL HQ	Model 2 Representative NOAEL HQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative NOAEL HQ	Model 4 Representative LOAEL HQ	Model 4 Representative NOAEL HQ
Antimony	0.01	0.08	0.00	0.01				
Arsenic	0.04	0.19	0.00	0.01				
Barium	0.07	0.66	0.00	0.04				
Beryllium	0.01	0.08	0.00	0.01				
Cadmium	0.00	0.03	0.00	0.02				
Cobalt	0.03	0.10	0.01	0.02				
Copper	0.02	0.03	0.00	0.00				
Manganese	0.07	0.24	0.03	0.10				
Nickel	0.02	0.03	0.00	0.01				
Selenium	0.04	0.39	0.01	0.07				
Silver	0.00	0.03	0.00	0.01				
Uranium	**1.63**	**16.3**	0.38	**3.82**				
Vanadium	0.13	**1.28**	0.01	0.10				
Zinc	0.01	0.11	0.00	0.02				

Mink

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative NOAEL HQ	Model 2 Representative LOAEL HQ	Model 2 Representative NOAEL HQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative NOAEL HQ	Model 4 Representative LOAEL HQ	Model 4 Representative NOAEL HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Barium	0.01	0.14	0.00	0.02	N/A	N/A	N/A	N/A
Beryllium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Cadmium	0.00	0.04	0.00	0.03	**1.82**	**18.18**	0.35	**3.45**
Cobalt	0.01	0.05	0.01	0.03	N/A	N/A	N/A	N/A
Copper	0.01	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.07	0.21	0.05	0.15	N/A	N/A	N/A	N/A
Nickel	0.01	0.02	0.01	0.01	**2.89**	**5.26**	0.57	**1.03**
Selenium	0.04	0.38	0.01	0.09	N/A	N/A	N/A	N/A
Silver	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.89	**8.90**	0.52	**5.22**	**197**	**1969**	**44.2**	**442**
Vanadium	0.03	0.27	0.01	0.06	N/A	N/A	N/A	N/A
Zinc	0.01	0.05	0.00	0.03	N/A	N/A	N/A	N/A

Mallard

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative NOAEL HQ	Model 2 Representative LOAEL HQ	Model 2 Representative NOAEL HQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative NOAEL HQ	Model 4 Representative LOAEL HQ	Model 4 Representative NOAEL HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.19	0.77	0.00	0.01				
Barium	0.10	0.20	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.02	0.00	0.00				
Cobalt	0.12	0.22	0.00	0.01				
Copper	0.25	0.31	0.01	0.01				
Manganese	0.01	0.12	0.00	0.01				
Nickel	0.09	0.13	0.00	0.00				
Selenium	0.07	0.13	0.00	0.01				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.05	0.47	0.00	0.02				
Vanadium	0.03	0.29	0.00	0.01				
Zinc	0.12	**2.45**	0.00	0.09				

Wilson's Snipe

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative NOAEL HQ	Model 2 Representative LOAEL HQ	Model 2 Representative NOAEL HQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative NOAEL HQ	Model 4 Representative LOAEL HQ	Model 4 Representative NOAEL HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.28	**1.13**	0.06	0.24				
Barium	0.15	0.29	0.03	0.06				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.03	0.00	0.01				
Cobalt	0.17	0.32	0.05	0.10				
Copper	0.36	0.45	0.10	0.12				
Manganese	0.02	0.18	0.01	0.07				
Nickel	0.14	0.19	0.04	0.06				
Selenium	0.10	0.20	0.04	0.07				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.07	0.70	0.02	0.20				
Vanadium	0.04	0.43	0.01	0.12				
Zinc	0.17	**3.62**	0.06	**1.34**				

Great Blue Heron

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative NOAEL HQ	Model 2 Representative LOAEL HQ	Model 2 Representative NOAEL HQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative NOAEL HQ	Model 4 Representative LOAEL HQ	Model 4 Representative NOAEL HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.25	0.99	0.11	0.45
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.31	0.43	0.14	0.20
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.12	**1.24**	0.07	0.66
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

Bald Eagle

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative NOAEL HQ	Model 2 Representative LOAEL HQ	Model 2 Representative NOAEL HQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative NOAEL HQ	Model 4 Representative LOAEL HQ	Model 4 Representative NOAEL HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.22	0.88	0.10	0.41
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.28	0.38	0.13	0.18
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.11	**1.11**	0.06	0.61
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 14. Summary of Hazard Quotient Calculations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01				
Arsenic	0.02	0.09	0.00	0.01				
Barium	0.02	0.17	0.00	0.01				
Beryllium	0.00	0.04	0.00	0.00				
Cadmium	0.00	0.00	0.00	0.00				
Cobalt	0.01	0.03	0.00	0.00				
Copper	0.00	0.01	0.00	0.00				
Manganese	0.04	0.14	0.00	0.01				
Nickel	0.01	0.01	0.00	0.00				
Selenium	0.01	0.13	0.00	0.02				
Silver	0.00	0.01	0.00	0.00				
Uranium	**1.06**	**10.6**	0.10	**1.03**				
Vanadium	0.14	**1.43**	0.01	0.10				
Zinc	0.00	0.02	0.00	0.00				

	Mink							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.02
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.01	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00	0.78	**1.43**	0.03	0.05
Selenium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A
Uranium	0.30	**3.00**	0.10	**1.04**	**27.2**	**272**	**6.56**	**65.6**
Vanadium	0.03	0.30	0.01	0.06	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	Mallard							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.09	0.36	0.00	0.01				
Barium	0.03	0.05	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.01	0.00	0.00				
Cobalt	0.04	0.08	0.00	0.00				
Copper	0.06	0.08	0.00	0.00				
Manganese	0.01	0.15	0.00	0.00				
Nickel	0.04	0.06	0.00	0.00				
Selenium	0.05	0.09	0.00	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.04	0.39	0.00	0.01				
Vanadium	0.03	0.32	0.00	0.01				
Zinc	0.03	0.61	0.00	0.01				

	Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.13	0.53	0.03	0.14				
Barium	0.04	0.07	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.02	0.00	0.01				
Cobalt	0.06	0.12	0.02	0.04				
Copper	0.10	0.12	0.03	0.03				
Manganese	0.02	0.22	0.01	0.05				
Nickel	0.06	0.08	0.02	0.02				
Selenium	0.07	0.14	0.03	0.06				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.06	0.57	0.01	0.12				
Vanadium	0.05	0.48	0.01	0.12				
Zinc	0.04	0.90	0.01	0.28				

	Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.08	0.12	0.01	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.02	0.17	0.01	0.10
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.08	0.10	0.01	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.02	0.15	0.01	0.09
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 15. Summary of Hazard Quotient Calculations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon								Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.01					0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Arsenic	0.02	0.09	0.00	0.01					0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A	0.09	0.37	0.00	0.01				
Barium	0.09	0.88	0.01	0.05					0.02	0.19	0.00	0.03	N/A	N/A	N/A	N/A	0.13	0.27	0.00	0.00				
Beryllium	0.03	0.32	0.00	0.02					0.01	0.08	0.00	0.02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.34	0.00	0.03					0.01	0.11	0.00	0.04	**1.83**	**18.3**	0.36	**3.55**	0.27	**1.06**	0.00	0.02				
Cobalt	0.06	0.24	0.01	0.03					0.02	0.08	0.01	0.04	N/A	N/A	N/A	N/A	0.31	0.58	0.01	0.01				
Copper	0.14	0.20	0.01	0.01					0.03	0.04	0.01	0.01	N/A	N/A	N/A	N/A	**1.82**	**2.24**	0.03	0.04				
Manganese	0.15	0.50	0.03	0.11					0.09	0.30	0.05	0.15	N/A	N/A	N/A	N/A	0.04	0.37	0.00	0.01				
Nickel	0.12	0.22	0.01	0.02					0.03	0.06	0.01	0.02	**3.30**	**6.01**	0.64	**1.17**	0.77	**1.07**	0.01	0.02				
Selenium	0.04	0.39	0.00	0.04					0.04	0.41	0.01	0.05	N/A	N/A	N/A	N/A	0.06	0.11	0.00	0.00				
Silver	0.00	0.01	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00				
Uranium	**8.06**	**80.6**	0.71	**7.13**					**2.39**	**23.9**	0.72	**7.23**	**247**	**2474**	**45.5**	**455**	0.29	**2.92**	0.01	0.05				
Vanadium	0.05	0.50	0.00	0.03					0.01	0.11	0.00	0.02	N/A	N/A	N/A	N/A	0.01	0.11	0.00	0.00				
Zinc	0.03	0.31	0.00	0.03					0.01	0.10	0.00	0.03	N/A	N/A	N/A	N/A	0.36	**7.66**	0.01	0.14				

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.14	0.55	0.03	0.13					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.20	0.39	0.04	0.08					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.39	**1.57**	0.08	0.32					0.00	0.01			0.25	0.99	0.11	0.46	0.00	0.01			0.22	0.89	0.11	0.42
Cobalt	0.45	0.86	0.10	0.18					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	**2.67**	**3.30**	0.55	0.68					0.01	0.01			N/A	N/A	N/A	N/A	0.01	0.01			N/A	N/A	N/A	N/A
Manganese	0.05	0.54	0.01	0.13					0.00	0.01			N/A	N/A	N/A	N/A	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	**1.14**	**1.57**	0.23	0.32					0.00	0.01			0.35	0.49	0.16	0.22	0.00	0.01			0.32	0.44	0.15	0.21
Selenium	0.09	0.17	0.03	0.06					0.00	0.01			N/A	N/A	N/A	N/A	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.43	**4.29**	0.09	0.86					0.00	0.02			0.16	**1.55**	0.07	0.68	0.00	0.02			0.14	**1.39**	0.06	0.62
Vanadium	0.02	0.17	0.00	0.03					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.53	**11.3**	0.11	**2.39**					0.00	0.05			N/A	N/A	N/A	N/A	0.00	0.05			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 16. Summary of Hazard Quotient Calculations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon								Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.02	0.17	0.00	0.02					0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Arsenic	0.05	0.26	0.00	0.02					0.01	0.05	0.00	0.01	N/A	N/A	N/A	N/A	0.26	1.06	0.01	0.03				
Barium	0.02	0.17	0.00	0.02					0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A	0.03	0.05	0.00	0.00				
Beryllium	0.00	0.02	0.00	0.00					0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.01	0.00	0.00					0.00	0.01	0.00	0.00	0.23	2.34	0.05	0.47	0.00	0.01	0.00	0.00				
Cobalt	0.01	0.03	0.00	0.01					0.01	0.02	0.01	0.02	N/A	N/A	N/A	N/A	0.02	0.04	0.00	0.00				
Copper	0.02	0.03	0.00	0.00					0.01	0.01	0.00	0.01	N/A	N/A	N/A	N/A	0.22	0.27	0.01	0.01				
Manganese	0.02	0.07	0.01	0.03					0.02	0.06	0.01	0.04	N/A	N/A	N/A	N/A	0.00	0.03	0.00	0.00				
Nickel	0.01	0.01	0.00	0.00					0.00	0.01	0.00	0.00	1.50	2.73	0.28	0.52	0.03	0.04	0.00	0.00				
Selenium	0.02	0.24	0.00	0.04					0.02	0.17	0.00	0.05	N/A	N/A	N/A	N/A	0.06	0.12	0.00	0.00				
Silver	0.00	0.01	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00				
Uranium	0.28	2.84	0.10	0.96					0.25	2.46	0.14	1.45	67.0	670	13.1	131	0.01	0.06	0.00	0.00				
Vanadium	0.21	2.05	0.02	0.20					0.04	0.43	0.01	0.12	N/A	N/A	N/A	N/A	0.05	0.47	0.00	0.01				
Zinc	0.00	0.03	0.00	0.01					0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A	0.03	0.58	0.00	0.02				

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.39	1.55	0.13	0.51					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.04	0.07	0.01	0.03					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.01	0.02	0.00	0.01					0.00	0.00			0.03	0.13	0.02	0.06	0.00	0.00			0.03	0.11	0.01	0.06
Cobalt	0.03	0.06	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.32	0.39	0.11	0.14					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.05	0.00	0.02					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.05	0.06	0.02	0.02					0.00	0.00			0.16	0.22	0.07	0.10	0.00	0.00			0.14	0.20	0.07	0.09
Selenium	0.09	0.17	0.03	0.07					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.01	0.08	0.00	0.03					0.00	0.00			0.04	0.42	0.02	0.20	0.00	0.00			0.04	0.38	0.02	0.18
Vanadium	0.07	0.69	0.02	0.24					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.04	0.86	0.02	0.33					0.00	0.01			N/A	N/A	N/A	N/A	0.00	0.01			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 17. Summary of Hazard Quotient Calculations
AOI: Outfall, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon								Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.02	0.19	0.00	0.02					0.00	0.05	0.00	0.02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Arsenic	0.06	0.28	0.01	0.03					0.01	0.06	0.00	0.02	N/A	N/A	N/A	N/A	0.29	**1.16**	0.01	0.03				
Barium	0.01	0.14	0.00	0.02					0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A	0.02	0.04	0.00	0.00				
Beryllium	0.00	0.01	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.02	0.00	0.00					0.00	0.00	0.00	0.00	0.01	0.10	0.00	0.03	0.02	0.07	0.00	0.00				
Cobalt	0.01	0.03	0.00	0.00					0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.08	0.00	0.00				
Copper	0.01	0.02	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.14	0.17	0.00	0.01				
Manganese	0.08	0.24	0.01	0.03					0.02	0.05	0.00	0.02	N/A	N/A	N/A	N/A	0.03	0.25	0.00	0.01				
Nickel	0.01	0.01	0.00	0.00					0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.04	0.05	0.00	0.00				
Selenium	0.02	0.17	0.00	0.02					0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A	0.07	0.13	0.00	0.00				
Silver	0.00	0.01	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00				
Uranium	0.53	**5.32**	0.06	0.60					0.12	**1.18**	0.04	0.38	**2.20**	**22.0**	0.37	**3.69**	0.02	0.20	0.00	0.01				
Vanadium	0.10	**1.02**	0.01	0.11					0.02	0.21	0.01	0.07	N/A	N/A	N/A	N/A	0.02	0.23	0.00	0.01				
Zinc	0.00	0.04	0.00	0.00					0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.05	**1.09**	0.00	0.03				

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.43	**1.70**	0.17	0.67					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.03	0.06	0.01	0.03					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.03	0.10	0.01	0.04					0.00	0.00			0.00	0.01	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.06	0.12	0.02	0.05					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.20	0.25	0.08	0.10					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	N/A	N/A	0.01	0.15					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.04	0.37	0.02	0.03					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.06	0.08	0.04	0.07					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.10	0.19	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01	0.01	0.12					0.00	0.00			0.00	0.01	0.00	0.01	0.00	0.00			0.00	0.01	0.00	0.01
Vanadium	0.03	0.30	0.01	0.13					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.03	0.34	0.03	0.63					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 18. Summary of Hazard Quotient Calculations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.03	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.01	0.18	0.89	0.16	0.81
Barium	0.01	0.05	0.00	0.03	0.49	**4.94**	0.45	**4.48**
Beryllium	0.00	0.02	0.00	0.01	0.69	**6.92**	0.63	**6.29**
Cadmium	0.00	0.02	0.00	0.01	0.22	**2.21**	0.20	**2.01**
Cobalt	0.00	0.01	0.00	0.01	0.47	**1.88**	0.43	**1.71**
Copper	0.00	0.00	0.00	0.00	0.70	**1.01**	0.63	0.92
Manganese	0.05	0.15	0.02	0.05	**21.7**	**69.9**	**19.7**	**63.6**
Nickel	0.00	0.01	0.00	0.00	0.57	**1.04**	0.52	0.95
Selenium	0.05	0.55	0.03	0.33	0.46	**4.59**	0.40	**4.01**
Silver	0.00	0.00	0.00	0.00	0.45	**4.49**	0.41	**4.09**
Uranium	0.20	**2.01**	0.09	0.89	**79.5**	**795**	**72.3**	**723**
Vanadium	0.02	0.21	0.02	0.15	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01	0.17	**1.74**	0.16	**1.58**

	Raccoon							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.00	0.02	0.12	0.01	0.04
Barium	0.01	0.10	0.00	0.01	0.07	0.66	0.02	0.19
Beryllium	0.00	0.04	0.00	0.00	0.08	0.84	0.03	0.26
Cadmium	0.00	0.03	0.00	0.00	0.05	0.49	0.02	0.15
Cobalt	0.00	0.01	0.00	0.00	0.06	0.23	0.02	0.07
Copper	0.00	0.01	0.00	0.00	0.11	0.16	0.03	0.05
Manganese	0.08	0.26	0.01	0.02	**2.59**	**8.38**	0.82	**2.66**
Nickel	0.01	0.01	0.00	0.00	0.07	0.13	0.02	0.04
Selenium	0.10	**1.04**	0.01	0.08	0.21	**2.09**	0.04	0.42
Silver	0.00	0.01	0.00	0.00	0.06	0.59	0.02	0.19
Uranium	0.38	**3.83**	0.02	0.22	**9.55**	**95.5**	**3.00**	**30.0**
Vanadium	0.04	0.40	0.00	0.04	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.04	0.42	0.01	0.13

	Mink							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.13	**1.30**	0.02	0.23
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.08	0.01	0.02	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.48	0.87	0.09	0.16
Selenium	0.02	0.23	0.00	0.05	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.08	0.83	0.01	0.14	0.92	**9.24**	0.3	**3**
Vanadium	0.01	0.08	0.00	0.02	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	Mallard							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.02	0.08	0.00	0.00	0.03	0.13	0.01	0.04
Barium	0.01	0.03	0.00	0.00	0.02	0.05	0.01	0.02
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.09	0.00	0.00	0.06	0.23	0.03	0.11
Cobalt	0.02	0.04	0.00	0.00	0.06	0.11	0.03	0.05
Copper	0.05	0.06	0.00	0.00	0.19	0.23	0.11	0.14
Manganese	0.03	0.26	0.00	0.00	0.13	**1.26**	0.08	0.80
Nickel	0.03	0.04	0.00	0.00	0.08	0.11	0.04	0.06
Selenium	0.40	0.80	0.01	0.02	0.43	0.87	0.03	0.07
Silver	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.04
Uranium	0.01	0.15	0.00	0.00	0.06	0.56	0.03	0.33
Vanadium	0.01	0.09	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.72	0.00	0.01	0.07	**1.59**	0.03	0.71

	Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.03	0.12	0.01	0.03				
Barium	0.02	0.04	0.01	0.01				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.14	0.01	0.03				
Cobalt	0.03	0.06	0.01	0.02				
Copper	0.07	0.09	0.02	0.03				
Manganese	0.04	0.38	0.01	0.06				
Nickel	0.04	0.06	0.01	0.01				
Selenium	0.59	**1.18**	0.15	0.30				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.02	0.22	0.00	0.04				
Vanadium	0.01	0.13	0.00	0.04				
Zinc	0.05	**1.05**	0.01	0.24				

	Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.07	0.01	0.03
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.05	0.07	0.02	0.03
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.06	0.01	0.03
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.05	0.06	0.02	0.03
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 19. Summary of Hazard Quotient Calculations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.03	N/A	N/A	N/A	N/A	0.01	0.06	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.02	0.18	0.90	0.10	0.50	0.01	0.04	0.00	0.00	0.03	0.14	0.00	0.02
Barium	0.01	0.08	0.01	0.05	0.50	**4.97**	0.46	**4.6**	0.02	0.15	0.00	0.01	0.07	0.72	0.02	0.20
Beryllium	0.00	0.02	0.00	0.02	0.69	**6.92**	0.15	**1.50**	0.00	0.04	0.00	0.00	0.08	0.84	0.01	0.07
Cadmium	0.01	0.07	0.00	0.05	0.23	**2.26**	0.51	**5.1**	0.01	0.10	0.00	0.02	0.06	0.56	0.03	0.30
Cobalt	0.02	0.07	0.01	0.04	0.49	**1.94**	0.17	0.67	0.03	0.13	0.00	0.01	0.09	0.34	0.01	0.04
Copper	0.00	0.00	0.00	0.00	0.70	**1.02**	0.26	0.38	0.01	0.01	0.00	0.00	0.11	0.16	0.02	0.03
Manganese	0.10	0.31	0.06	0.19	**21.7**	**70.1**	**19.7**	**64**	0.15	0.47	0.03	0.10	**2.66**	**8.58**	0.85	**2.73**
Nickel	0.02	0.04	0.01	0.03	0.59	**1.08**	0.49	0.90	0.04	0.07	0.00	0.01	0.11	0.19	0.03	0.05
Selenium	0.07	0.71	0.04	0.35	0.48	**4.75**	0.40	**4.03**	0.14	**1.35**	0.01	0.08	0.24	**2.40**	0.04	0.42
Silver	0.00	0.01	0.00	0.00	0.45	**4.50**	0.01	0.12	0.00	0.01	0.00	0.00	0.06	0.60	0.00	0.03
Uranium	**2.49**	**24.9**	**1.18**	**11.8**	**81.8**	**818**	**73.4**	**734**	**4.75**	**47.5**	0.28	**2.77**	**13.9**	**139**	**3.26**	**32.6**
Vanadium	0.05	0.46	0.02	0.21	N/A	N/A	N/A	N/A	0.09	0.87	0.00	0.05	N/A	N/A	N/A	N/A
Zinc	0.01	0.10	0.01	0.05	0.18	**1.83**	0.16	**1.62**	0.02	0.18	0.00	0.02	0.06	0.58	0.01	0.14

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.16	0.00	0.00	0.05	0.21	0.01	0.04
Barium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A	0.02	0.05	0.00	0.00	0.03	0.07	0.01	0.02
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.05	0.00	0.03	**1.38**	**13.78444**	0.32	**3.16**	0.07	0.27	0.00	0.01	0.10	0.40	0.03	0.12
Cobalt	0.01	0.03	0.00	0.01	N/A	N/A	N/A	N/A	0.18	0.35	0.00	0.01	0.22	0.41	0.03	0.06
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.09	0.00	0.00	0.21	0.26	0.11	0.14
Manganese	0.07	0.22	0.04	0.13	N/A	N/A	N/A	N/A	0.04	0.39	0.00	0.01	0.14	**1.40**	0.08	0.81
Nickel	0.01	0.02	0.01	0.01	**1.64**	**3.00**	0.40	0.73	0.24	0.32	0.01	0.01	0.29	0.40	0.05	0.06
Selenium	0.03	0.29	0.00	0.05	N/A	N/A	N/A	N/A	0.52	**1.04**	0.01	0.02	0.55	**1.11**	0.03	0.07
Silver	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.04
Uranium	**1.02**	**10.2**	0.17	**1.68**	**6.96**	**69.6**	**1.08**	**10.8**	0.18	**1.83**	0.00	0.03	0.22	**2.25**	0.04	0.36
Vanadium	0.02	0.18	0.00	0.03	N/A	N/A	N/A	N/A	0.02	0.20	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.05	0.00	0.01	N/A	N/A	N/A	N/A	0.22	**4.60**	0.00	0.09	0.26	**5.48**	0.04	0.78

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.06	0.24	0.02	0.08					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.03	0.07	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.10	0.40	0.03	0.13					0.00	0.00			0.19	0.75	0.10	0.41
Cobalt	0.27	0.51	0.06	0.12					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.10	0.13	0.04	0.05					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.06	0.58	0.02	0.15					0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.35	0.48	0.09	0.13					0.00	0.00			0.18	0.24	0.10	0.14
Selenium	0.77	**1.54**	0.16	0.33					0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.27	**2.69**	0.06	0.55					0.00	0.01			0.00	0.04	0.00	0.02
Vanadium	0.03	0.29	0.01	0.06					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.32	**6.77**	0.08	**1.60**					0.00	0.03			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.17	0.67	0.09	0.38
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.16	0.22	0.09	0.13
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01			0.00	0.04	0.00	0.01
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.03			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 20. Summary of Hazard Quotient Calculations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.04	0.00	0.04	N/A	N/A	N/A	N/A	0.01	0.08	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.03	0.00	0.01	0.11	0.56	0.10	0.49	0.01	0.06	0.00	0.00	0.04	0.18	0.01	0.04
Barium	0.01	0.09	0.01	0.05	0.50	**5.04**	0.46	**4.56**	0.02	0.17	0.00	0.01	0.09	0.94	0.03	0.26
Beryllium	0.00	0.01	0.00	0.00	0.16	**1.64**	0.15	**1.49**	0.00	0.01	0.00	0.00	0.02	0.22	0.01	0.07
Cadmium	0.00	0.01	0.00	0.01	0.56	**5.58**	0.51	**5.07**	0.00	0.02	0.00	0.00	0.16	**1.55**	0.05	0.50
Cobalt	0.00	0.02	0.00	0.01	0.18	0.71	0.16	0.64	0.01	0.03	0.00	0.00	0.04	0.16	0.01	0.04
Copper	0.00	0.00	0.00	0.00	0.29	0.42	0.26	0.38	0.01	0.01	0.00	0.00	0.05	0.07	0.01	0.02
Manganese	0.03	0.11	0.01	0.04	**11.1**	**35.9**	**10.1**	**32.6**	0.06	0.19	0.00	0.01	**1.47**	**4.73**	0.46	**1.49**
Nickel	0.00	0.01	0.00	0.00	0.53	0.97	0.48	0.88	0.01	0.01	0.00	0.00	0.08	0.14	0.02	0.04
Selenium	0.01	0.07	0.01	0.06	0.41	**4.11**	0.37	**3.74**	0.01	0.13	0.00	0.02	0.82	**8.21**	0.26	**2.64**
Silver	0.00	0.01	0.00	0.01	0.01	0.14	0.01	0.12	0.00	0.02	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.06	0.56	0.02	0.19	**8.21**	**82.1**	**7.44**	**74.4**	0.10	**1.04**	0.01	0.05	**1.13**	**11.3**	0.34	**3.39**
Vanadium	0.06	0.58	0.03	0.34	N/A	N/A	N/A	N/A	0.11	**1.10**	0.01	0.08	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01	0.25	**2.46**	0.22	**2.23**	0.00	0.03	0.00	0.00	0.04	0.45	0.01	0.14

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.25	0.00	0.00	0.07	0.29	0.01	0.04
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A	0.03	0.05	0.00	0.00	0.04	0.08	0.01	0.02
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.11	**1.15**	0.01	0.07	0.02	0.07	0.00	0.00	0.12	0.47	0.08	0.32
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.08	0.00	0.00	0.06	0.11	0.01	0.03
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.09	0.00	0.00	0.13	0.16	0.05	0.06
Manganese	0.02	0.06	0.00	0.01	N/A	N/A	N/A	N/A	0.02	0.19	0.00	0.00	0.07	0.72	0.04	0.43
Nickel	0.00	0.00	0.00	0.00	0.38	0.69	0.01	0.02	0.04	0.05	0.00	0.00	0.09	0.12	0.04	0.06
Selenium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A	0.05	0.10	0.00	0.00	0.22	0.43	0.13	0.27
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Uranium	0.03	0.25	0.00	0.04	**1.09**	**10.9**	0.13	**1.29**	0.00	0.04	0.00	0.00	0.01	0.08	0.00	0.04
Vanadium	0.02	0.24	0.00	0.05	N/A	N/A	N/A	N/A	0.03	0.25	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.75	0.00	0.01	0.09	**1.81**	0.04	0.85

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.09	0.37	0.01	0.05					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.04	0.08	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.02	0.10	0.01	0.02					0.00	0.00			0.02	0.06	0.00	0.01
Cobalt	0.06	0.12	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.11	0.13	0.02	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.03	0.27	0.01	0.05					0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.05	0.07	0.01	0.01					0.00	0.00			0.04	0.06	0.00	0.00
Selenium	0.07	0.15	0.03	0.06					0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.02	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.01	0.06	0.00	0.01					0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.04	0.37	0.01	0.10					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.05	**1.10**	0.01	0.23					0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.06	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.04	0.05	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 21. Summary of Hazard Quotient Calculations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.01	0.06	N/A	N/A	N/A	N/A	0.01	0.13	0.00	0.02	N/A	N/A	N/A	N/A
Arsenic	0.01	0.03	0.00	0.02	0.11	0.56	0.10	0.50	0.01	0.05	0.00	0.00	0.03	0.17	0.01	0.04
Barium	0.02	0.17	0.01	0.11	0.51	**5.12**	0.46	**4.62**	0.03	0.33	0.00	0.03	0.11	**1.09**	0.03	0.28
Beryllium	0.00	0.02	0.00	0.01	0.17	**1.65**	0.15	**1.49**	0.00	0.04	0.00	0.00	0.02	0.25	0.01	0.07
Cadmium	0.01	0.14	0.01	0.08	0.57	**5.71**	0.52	**5.15**	0.03	0.27	0.00	0.02	0.18	**1.81**	0.05	0.52
Cobalt	0.01	0.02	0.00	0.01	0.18	0.72	0.16	0.65	0.01	0.05	0.00	0.00	0.04	0.17	0.01	0.04
Copper	0.00	0.00	0.00	0.00	0.29	0.42	0.26	0.38	0.01	0.01	0.00	0.00	0.05	0.07	0.01	0.02
Manganese	0.31	**1.00**	0.19	0.61	**11.4**	**36.8**	**10.3**	**33.2**	0.59	**1.91**	0.04	0.14	**2.00**	**6.45**	0.50	**1.62**
Nickel	0.03	0.05	0.01	0.02	0.55	**1.01**	0.49	0.90	0.05	0.09	0.00	0.01	0.12	0.22	0.03	0.05
Selenium	0.22	**2.18**	0.11	**1.12**	0.62	**6.22**	0.48	**4.80**	0.42	**4.16**	0.03	0.26	**1.22**	**12.2**	0.29	**2.89**
Silver	0.00	0.01	0.00	0.01	0.01	0.13	0.01	0.12	0.00	0.01	0.00	0.00	0.01	0.09	0.00	0.03
Uranium	0.06	0.59	0.03	0.33	**8.21**	**82.1**	**7.46**	**74.6**	0.11	**1.10**	0.01	0.08	**1.14**	**11.4**	0.34	**3.42**
Vanadium	0.05	0.55	0.05	0.46	N/A	N/A	N/A	N/A	0.10	**1.05**	0.01	0.11	N/A	N/A	N/A	N/A
Zinc	0.01	0.06	0.00	0.03	0.25	**2.50**	0.23	**2.26**	0.01	0.11	0.00	0.01	0.05	0.53	0.01	0.14

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.21	0.00	0.00	0.06	0.25	0.01	0.04
Barium	0.01	0.07	0.00	0.02	N/A	N/A	N/A	N/A	0.05	0.10	0.00	0.00	0.06	0.12	0.01	0.02
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.01	0.06	0.00	0.01	0.07	0.73	0.01	0.12	0.23	0.91	0.00	0.02	0.33	**1.31**	0.08	0.34
Cobalt	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.12	0.00	0.00	0.08	0.16	0.01	0.03
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.09	0.00	0.00	0.13	0.16	0.05	0.06
Manganese	0.13	0.41	0.03	0.09	N/A	N/A	N/A	N/A	0.20	**2.00**	0.00	0.04	0.25	**2.53**	0.05	0.46
Nickel	0.01	0.02	0.00	0.00	0.14	0.26	0.02	0.03	0.31	0.43	0.01	0.01	0.36	0.50	0.05	0.06
Selenium	0.09	0.88	0.02	0.15	N/A	N/A	N/A	N/A	**1.61**	**3.21**	0.03	0.05	**1.77**	**3.55**	0.16	0.32
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Uranium	0.03	0.25	0.01	0.06	0.66	**6.62**	0.13	**1.28**	0.00	0.04	0.00	0.00	0.01	0.09	0.00	0.04
Vanadium	0.02	0.22	0.01	0.06	N/A	N/A	N/A	N/A	0.02	0.24	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A	0.14	**3.02**	0.00	0.06	0.19	**4.09**	0.04	0.90

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.08	0.30	0.02	0.08					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.07	0.14	0.02	0.04					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.33	**1.33**	0.08	0.34					0.00	0.00			0.01	0.04	0.00	0.02
Cobalt	0.10	0.18	0.02	0.05					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.11	0.13	0.02	0.03					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.29	**2.94**	0.08	0.78					0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.46	0.64	0.11	0.15					0.00	0.00			0.02	0.02	0.00	0.01
Selenium	**2.36**	**4.73**	0.53	**1.05**					0.01	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.01	0.06	0.00	0.02					0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.04	0.35	0.01	0.13					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.21	**4.45**	0.05	**1.06**					0.00	0.01			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.04	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.01			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.01	0.02	0.00	0.01
Selenium	0.00	0.01			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 22. Summary of Hazard Quotient Calculations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.04	0.00	0.03	N/A	N/A	N/A	N/A	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.01	0.14	0.72	0.13	0.65	0.00	0.02	0.00	0.00	0.02	0.12	0.01	0.03
Barium	0.00	0.05	0.00	0.02	**3.06**	**30.6**	**2.79**	**27.9**	0.01	0.09	0.00	0.01	0.43	**4.26**	0.14	**1.36**
Beryllium	0.00	0.00	0.00	0.00	0.03	0.27	0.02	0.25	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.01
Cadmium	0.00	0.02	0.00	0.00	0.05	0.45	0.04	0.40	0.00	0.03	0.00	0.00	0.01	0.14	0.00	0.04
Cobalt	0.00	0.01	0.00	0.00	0.09	0.36	0.08	0.32	0.00	0.02	0.00	0.00	0.02	0.07	0.00	0.02
Copper	0.00	0.00	0.00	0.00	0.30	0.44	0.28	0.40	0.00	0.00	0.00	0.00	0.06	0.09	0.02	0.03
Manganese	0.09	0.31	0.01	0.03	**4.57**	**14.7**	**4.08**	**13.2**	0.18	0.59	0.00	0.01	0.76	**2.46**	0.19	0.62
Nickel	0.00	0.00	0.00	0.00	0.07	0.14	0.07	0.12	0.00	0.01	0.00	0.00	0.02	0.03	0.00	0.01
Selenium	0.03	0.28	0.03	0.26	0.43	**4.32**	0.39	**3.94**	0.05	0.53	0.01	0.06	0.14	**1.38**	0.03	0.34
Silver	0.00	0.00	0.00	0.00	0.02	0.25	0.02	0.23	0.00	0.00	0.00	0.00	0.01	0.07	0.00	0.02
Uranium	0.01	0.15	0.01	0.07	**1.59**	**15.9**	**1.44**	**14.4**	0.03	0.27	0.00	0.02	0.25	**2.49**	0.07	0.74
Vanadium	0.02	0.15	0.01	0.14	N/A	N/A	N/A	N/A	0.03	0.29	0.00	0.03	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	0.07	0.68	0.06	0.62	0.00	0.01	0.00	0.00	0.03	0.29	0.01	0.09

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.08	0.00	0.00	0.03	0.13	0.01	0.04
Barium	0.00	0.02	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.03	0.00	0.00	0.08	0.16	0.05	0.11
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.04	0.40	0.01	0.12	0.02	0.09	0.00	0.00	0.03	0.13	0.01	0.02
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.05	0.00	0.00	0.04	0.07	0.01	0.01
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.01	0.00	0.00	0.08	0.10	0.06	0.07
Manganese	0.04	0.12	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.62	0.00	0.00	0.08	0.83	0.02	0.17
Nickel	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.04	0.06	0.01	0.01
Selenium	0.01	0.12	0.00	0.04	N/A	N/A	N/A	N/A	0.20	0.40	0.01	0.01	0.23	0.46	0.03	0.06
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.01	0.07	0.00	0.01	0.58	**5.79**	0.03	0.33	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01
Vanadium	0.01	0.06	0.00	0.02	N/A	N/A	N/A	N/A	0.01	0.06	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.31	0.00	0.00	0.04	0.82	0.02	0.41

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.03	0.12	0.01	0.03					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.02	0.04	0.00	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.03	0.14	0.00	0.01					0.00	0.00			0.01	0.02	0.00	0.02
Cobalt	0.04	0.08	0.00	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.01	0.02	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.09	0.90	0.00	0.04					0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.05	0.07	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.30	0.59	0.12	0.23					0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.01	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.01	0.10	0.00	0.04					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.02	0.46	0.00	0.08					0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.02	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 23. Summary of Hazard Quotient Calculations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.05	0.00	0.04	N/A	N/A	N/A	N/A	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.03	0.14	0.00	0.01	0.31	**1.55**	0.26	**1.30**	0.05	0.27	0.00	0.00	0.09	0.46	0.01	0.06
Barium	0.04	0.44	0.00	0.05	**1.69**	**16.9**	**1.51**	**15.1**	0.08	0.85	0.00	0.01	0.29	**2.90**	0.07	0.68
Beryllium	0.00	0.01	0.00	0.00	0.26	**2.62**	0.24	**2.38**	0.00	0.03	0.00	0.00	0.04	0.36	0.01	0.11
Cadmium	0.01	0.14	0.00	0.01	**1.90**	**19.0**	**1.72**	**17.2**	0.03	0.27	0.00	0.00	0.27	**2.66**	0.08	0.78
Cobalt	0.02	0.09	0.00	0.01	0.21	0.86	0.18	0.70	0.05	0.18	0.00	0.00	0.07	0.28	0.01	0.03
Copper	0.00	0.00	0.00	0.00	0.34	0.50	0.31	0.46	0.00	0.01	0.00	0.00	0.06	0.08	0.02	0.03
Manganese	0.80	**2.60**	0.06	0.19	**49.6**	**160**	**44.5**	**144**	**1.54**	**4.96**	0.01	0.04	**7.44**	**24.0**	**1.93**	**6.24**
Nickel	0.04	0.07	0.00	0.01	**1.16**	**2.11**	**1.02**	**1.87**	0.07	0.13	0.00	0.00	0.21	0.38	0.05	0.08
Selenium	0.02	0.21	0.04	0.36	0.69	**6.94**	0.65	**6.49**	0.04	0.38	0.01	0.09	0.15	**1.53**	0.05	0.47
Silver	0.00	0.01	0.00	0.00	0.06	0.63	0.06	0.57	0.00	0.01	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.03	0.34	0.01	0.11	**7.35**	**73.5**	**6.68**	**66.8**	0.06	0.63	0.00	0.03	**1.04**	**10.4**	0.32	**3.21**
Vanadium	0.04	0.42	0.02	0.20	N/A	N/A	N/A	N/A	0.08	0.80	0.00	0.05	N/A	N/A	N/A	N/A
Zinc	0.01	0.08	0.00	0.01	0.52	**5.17**	0.46	**4.64**	0.02	0.15	0.00	0.00	0.09	0.91	0.02	0.25

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.01	0.06	0.00	0.00	N/A	N/A	N/A	N/A	0.28	**1.13**	0.00	0.00	0.30	**1.21**	0.02	0.07
Barium	0.02	0.18	0.00	0.01	N/A	N/A	N/A	N/A	0.13	0.26	0.00	0.00	0.16	0.33	0.03	0.06
Beryllium	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.01	0.06	0.00	0.00	0.07	0.68	0.01	0.06	0.23	0.91	0.00	0.00	0.45	**1.80**	0.18	0.71
Cobalt	0.01	0.04	0.00	0.00	N/A	N/A	N/A	N/A	0.25	0.48	0.00	0.00	0.27	0.51	0.01	0.02
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.06	0.00	0.00	0.12	0.15	0.06	0.07
Manganese	0.33	**1.05**	0.01	0.03	N/A	N/A	N/A	N/A	0.52	**5.21**	0.00	0.01	0.75	**7.5**	0.18	**1.84**
Nickel	0.02	0.03	0.00	0.00	0.04	0.07	0.00	0.01	0.47	0.65	0.00	0.00	0.57	0.79	0.08	0.12
Selenium	0.01	0.10	0.01	0.07	N/A	N/A	N/A	N/A	0.14	0.28	0.01	0.02	0.18	0.37	0.04	0.08
Silver	0.00	0.01	0.00	0.01	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Uranium	0.02	0.16	0.00	0.02	0.83	**8.32**	0.05	0.52	0.00	0.02	0.00	0.00	0.01	0.06	0.00	0.03
Vanadium	0.02	0.17	0.00	0.03	N/A	N/A	N/A	N/A	0.02	0.18	0.00	0.00	0.02	0.18	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	N/A	N/A	N/A	N/A	0.19	**3.98**	0.00	0.02	0.28	**6.0**	0.08	**1.65**

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.41	**1.66**	0.02	0.07					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.19	0.38	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.33	**1.33**	0.01	0.06					0.00	0.00			0.01	0.04	0.00	0.01
Cobalt	0.37	0.71	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.07	0.09	0.01	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.77	**7.65**	0.02	0.24					0.00	0.02			N/A	N/A	N/A	N/A
Nickel	0.69	0.95	0.03	0.04					0.00	0.00			0.00	0.01	0.00	0.00
Selenium	0.21	0.42	0.16	0.32					0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.03	0.00	0.00					0.00	0.00			0.00	0.01	0.00	0.00
Vanadium	0.03	0.27	0.01	0.06					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.27	**5.85**	0.01	0.31					0.00	0.01			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.03	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.02			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.01	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.01			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 24. Summary of Hazard Quotient Calculations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.05	0.00	0.04	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.02	0.28	**1.43**	0.26	**1.30**
Barium	0.01	0.09	0.00	0.05	**1.66**	**16.6**	**1.51**	**15.1**
Beryllium	0.00	0.01	0.00	0.00	0.26	**2.61**	0.24	**2.38**
Cadmium	0.00	0.02	0.00	0.01	**1.89**	**18.9**	**1.72**	**17.2**
Cobalt	0.00	0.01	0.00	0.01	0.19	0.77	0.17	0.70
Copper	0.00	0.00	0.00	0.00	0.34	0.50	0.31	0.46
Manganese	0.05	0.15	0.02	0.05	**48.8**	**158**	**44.4**	**143**
Nickel	0.00	0.01	0.00	0.00	**1.12**	**2.05**	**1.02**	**1.86**
Selenium	0.01	0.08	0.01	0.07	0.68	**6.81**	0.62	**6.20**
Silver	0.00	0.00	0.00	0.00	0.06	0.63	0.06	0.57
Uranium	0.02	0.20	0.01	0.10	**7.34**	**73.4**	**6.68**	**66.8**
Vanadium	0.04	0.38	0.03	0.29	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01	0.51	**5.11**	0.46	**4.64**

	Raccoon							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.08	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.01	0.04	0.00	0.00	0.04	0.23	0.01	0.06
Barium	0.02	0.18	0.00	0.01	0.22	**2.23**	0.07	0.68
Beryllium	0.00	0.01	0.00	0.00	0.03	0.34	0.01	0.11
Cadmium	0.00	0.03	0.00	0.00	0.24	**2.41**	0.08	0.78
Cobalt	0.01	0.02	0.00	0.00	0.03	0.12	0.01	0.03
Copper	0.00	0.00	0.00	0.00	0.06	0.08	0.02	0.03
Manganese	0.09	0.29	0.00	0.01	**5.99**	**19.3**	**1.92**	**6.21**
Nickel	0.01	0.01	0.00	0.00	0.15	0.27	0.05	0.08
Selenium	0.01	0.14	0.00	0.02	0.13	**1.30**	0.04	0.39
Silver	0.00	0.01	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.04	0.38	0.00	0.03	**1.02**	**10.2**	0.32	**3.21**
Vanadium	0.07	0.72	0.01	0.07	N/A	N/A	N/A	N/A
Zinc	0.00	0.03	0.00	0.00	0.08	0.80	0.02	0.25

	Mink							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.04	0.00	0.01	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00	0.05	0.47	0.01	0.07
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.06	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00
Selenium	0.00	0.03	0.00	0.01	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.01	0.09	0.00	0.02	0.23	**2.29**	0.04	0.40
Vanadium	0.02	0.16	0.00	0.04	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A

	Mallard							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.04	0.17	0.00	0.00	0.06	0.25	0.02	0.07
Barium	0.03	0.05	0.00	0.00	0.06	0.12	0.03	0.06
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.09	0.00	0.00	0.25	0.99	0.18	0.71
Cobalt	0.03	0.06	0.00	0.00	0.05	0.09	0.01	0.02
Copper	0.04	0.05	0.00	0.00	0.11	0.13	0.06	0.07
Manganese	0.03	0.30	0.00	0.00	0.26	**2.60**	0.18	**1.83**
Nickel	0.05	0.07	0.00	0.00	0.16	0.22	0.08	0.11
Selenium	0.06	0.11	0.00	0.00	0.10	0.20	0.04	0.07
Silver	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
Uranium	0.00	0.01	0.00	0.00	0.01	0.06	0.00	0.03
Vanadium	0.02	0.16	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.04	0.90	0.00	0.02	0.14	**2.97**	0.08	**1.65**

	Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.06	0.25	0.02	0.08				
Barium	0.04	0.08	0.01	0.02				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.14	0.00	0.02				
Cobalt	0.04	0.08	0.01	0.02				
Copper	0.06	0.07	0.02	0.02				
Manganese	0.04	0.44	0.01	0.06				
Nickel	0.08	0.11	0.01	0.02				
Selenium	0.08	0.16	0.03	0.06				
Silver	0.00	0.01	0.00	0.00				
Uranium	0.00	0.02	0.00	0.00				
Vanadium	0.02	0.24	0.01	0.08				
Zinc	0.06	**1.33**	0.01	0.30				

	Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.03	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.02	0.00	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 25. Summary of Hazard Quotient Calculations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.04	0.00	0.03	N/A	N/A	N/A	N/A	0.01	0.07	0.00	0.01	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.02	0.28	**1.43**	0.26	**1.31**	0.01	0.04	0.00	0.00	0.05	0.23	0.01	0.07
Barium	0.01	0.05	0.00	0.05	**1.66**	**16.6**	**1.51**	**15.1**	0.01	0.10	0.00	0.01	0.22	**2.16**	0.07	0.68
Beryllium	0.00	0.00	0.00	0.00	0.26	**2.61**	0.24	**2.38**	0.00	0.00	0.00	0.00	0.03	0.33	0.01	0.11
Cadmium	0.00	0.00	0.00	0.00	**1.89**	**18.9**	**1.72**	**17.2**	0.00	0.00	0.00	0.00	0.24	**2.39**	0.08	0.78
Cobalt	0.00	0.00	0.00	0.00	0.19	0.77	0.17	0.70	0.00	0.01	0.00	0.00	0.03	0.11	0.01	0.03
Copper	0.00	0.00	0.00	0.00	0.34	0.50	0.31	0.46	0.00	0.00	0.00	0.00	0.05	0.08	0.02	0.03
Manganese	0.00	0.01	0.00	0.01	**48.8**	**157**	**44.4**	**143**	0.01	0.02	0.00	0.00	**5.91**	**19.1**	**1.92**	**6.20**
Nickel	0.00	0.00	0.00	0.00	**1.12**	**2.04**	**1.02**	**1.86**	0.00	0.00	0.00	0.00	0.14	0.25	0.05	0.08
Selenium	0.01	0.07	0.01	0.07	0.68	**6.81**	0.62	**6.20**	0.01	0.13	0.00	0.02	0.13	**1.28**	0.04	0.40
Silver	0.00	0.00	0.00	0.00	0.06	0.63	0.06	0.57	0.00	0.01	0.00	0.00	0.01	0.10	0.00	0.03
Uranium	0.00	0.02	0.00	0.02	**7.32**	**73.2**	**6.67**	**66.7**	0.00	0.03	0.00	0.00	0.98	**9.83**	0.32	**3.19**
Vanadium	0.04	0.41	0.04	0.37	N/A	N/A	N/A	N/A	0.08	0.78	0.01	0.09	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.02	0.51	**5.11**	0.47	**4.66**	0.00	0.04	0.00	0.01	0.08	0.81	0.03	0.25

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.18	0.00	0.01	0.07	0.26	0.02	0.07
Barium	0.00	0.02	0.00	0.01	N/A	N/A	N/A	N/A	0.02	0.03	0.00	0.00	0.05	0.10	0.03	0.06
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.01	0.13	0.00	0.04	0.00	0.01	0.00	0.00	0.23	0.91	0.18	0.71
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.02	0.00	0.00	0.03	0.05	0.01	0.02
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.03	0.00	0.00	0.10	0.12	0.06	0.07
Manganese	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.02	0.00	0.00	0.23	**2.32**	0.18	**1.82**
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.12	0.16	0.08	0.11
Selenium	0.00	0.04	0.00	0.02	N/A	N/A	N/A	N/A	0.05	0.10	0.00	0.00	0.09	0.18	0.04	0.07
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Uranium	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.03
Vanadium	0.02	0.16	0.01	0.05	N/A	N/A	N/A	N/A	0.02	0.18	0.00	0.01	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A	0.06	**1.18**	0.00	0.04	0.15	**3.24**	0.08	**1.67**

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.07	0.27	0.03	0.10					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.02	0.05	0.01	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.02	0.00	0.01					0.00	0.00			0.00	0.01	0.00	0.01
Cobalt	0.02	0.04	0.01	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.04	0.05	0.02	0.02					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.03	0.00	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.02	0.02	0.01	0.01					0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.07	0.14	0.03	0.06					0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.01	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.03	0.26	0.01	0.10					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.08	**1.73**	0.03	0.68					0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.01	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ $\geq$ 1.0

Table R 26. Summary of Hazard Quotient Calculations
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.06	0.00	0.02					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.01					0.05	0.19	0.01	0.04	0.05	0.20	0.01	0.05
Beryllium	0.00	0.01	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00					0.02	0.07	0.00	0.01	0.22	0.86	0.15	0.60
Cobalt	0.00	0.01	0.00	0.00					0.05	0.09	0.01	0.01	0.05	0.10	0.01	0.02
Copper	0.00	0.00	0.00	0.00					0.05	0.07	0.01	0.02	0.43	0.53	0.30	0.37
Manganese	0.04	0.12	0.01	0.04					0.03	0.30	0.00	0.04	0.05	0.54	0.02	0.22
Molybdenum	0.01	0.06	0.00	0.03					0.01	0.11	0.00	0.02	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00					0.03	0.04	0.01	0.01	0.05	0.07	0.02	0.03
Selenium	0.04	0.37	0.01	0.06					0.40	0.80	0.03	0.05	0.65	**1.30**	0.22	0.43
Uranium	0.08	0.79	0.05	0.51					0.01	0.08	0.00	0.02	0.02	0.16	0.01	0.08
Vanadium	0.08	0.79	0.03	0.29					0.05	0.50	0.01	0.08	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.01					0.03	0.57	0.01	0.14	0.30	**6.43**	0.21	**4.54**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 27. Summary of Hazard Quotient Calculations
AOI: Central Drainage PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.07	0.00	0.03					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.01	0.07	0.01	0.03					0.20	0.78	0.04	0.17	0.20	0.80	0.05	0.18
Beryllium	0.01	0.06	0.00	0.02					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.01	0.09	0.00	0.05					0.15	0.61	0.03	0.13	0.35	**1.40**	0.18	0.73
Cobalt	0.02	0.08	0.01	0.04					0.31	0.58	0.06	0.11	0.31	0.59	0.06	0.12
Copper	0.01	0.01	0.00	0.00					0.24	0.30	0.05	0.06	0.62	0.77	0.33	0.41
Manganese	0.09	0.28	0.05	0.17					0.05	0.49	0.01	0.11	0.07	0.73	0.03	0.29
Molybdenum	0.01	0.13	0.01	0.07					0.02	0.25	0.01	0.05	N/A	N/A	N/A	N/A
Nickel	0.03	0.05	0.01	0.02					0.42	0.58	0.07	0.09	0.44	0.61	0.08	0.12
Selenium	0.00	0.04	0.00	0.02					0.04	0.08	0.01	0.02	0.29	0.58	0.20	0.39
Uranium	**1.56**	**15.6**	0.68	**6.79**					0.17	**1.68**	0.03	0.32	0.18	**1.75**	0.04	0.37
Vanadium	0.06	0.60	0.03	0.33					0.04	0.38	0.01	0.09	N/A	N/A	N/A	N/A
Zinc	0.01	0.14	0.00	0.05					0.46	**9.78**	0.07	**1.46**	0.73	**15.6**	0.28	**5.86**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 28. Summary of Hazard Quotient Calculations
AOI: Upper Eastern Drainage PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.00	0.05	0.00	0.03					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.01					0.05	0.21	0.02	0.06	0.12	0.48	0.07	0.27
Beryllium	0.00	0.01	0.00	0.01					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.01	0.00	0.00					0.02	0.07	0.00	0.02	0.86	**3.43**	0.64	**2.54**
Cobalt	0.00	0.01	0.00	0.01					0.03	0.06	0.01	0.02	0.11	0.20	0.06	0.12
Copper	0.00	0.00	0.00	0.00					0.08	0.10	0.02	0.03	0.24	0.29	0.14	0.17
Manganese	0.02	0.06	0.01	0.02					0.01	0.13	0.00	0.03	0.07	0.70	0.05	0.45
Molybdenum	0.01	0.06	0.00	0.03					0.01	0.11	0.00	0.02	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00					0.04	0.05	0.01	0.01	0.11	0.16	0.07	0.09
Selenium	0.00	0.02	0.00	0.03					0.02	0.04	0.01	0.02	**3.30**	**6.60**	**2.47**	**4.94**
Uranium	0.03	0.27	0.02	0.16					0.00	0.03	0.00	0.01	0.01	0.07	0.00	0.04
Vanadium	0.05	0.50	0.04	0.38					0.03	0.32	0.01	0.10	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.01					0.03	0.74	0.01	0.24	0.23	**4.97**	0.16	**3.42**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 29. Summary of Hazard Quotient Calculations
AOI: Lower Eastern Drainage PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Antimony	0.00	0.04	0.00	0.04					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.01	0.03	0.00	0.02					0.10	0.39	0.03	0.11	0.17	0.67	0.08	0.32
Beryllium	0.00	0.02	0.00	0.01					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.16	0.01	0.10					0.38	**1.50**	0.10	0.40	**1.22**	**4.86**	0.73	**2.92**
Cobalt	0.01	0.02	0.00	0.02					0.08	0.15	0.03	0.05	0.15	0.29	0.08	0.16
Copper	0.00	0.00	0.00	0.00					0.10	0.12	0.03	0.04	0.25	0.31	0.15	0.19
Manganese	0.22	0.71	0.14	0.46					0.21	**2.07**	0.06	0.59	0.26	**2.63**	0.10	**1.01**
Molybdenum	0.02	0.16	0.01	0.11					0.03	0.30	0.01	0.09	N/A	N/A	N/A	N/A
Nickel	0.02	0.04	0.01	0.02					0.35	0.49	0.11	0.15	0.43	0.60	0.17	0.23
Selenium	0.01	0.08	0.01	0.05					0.09	0.17	0.02	0.05	**3.36**	**6.73**	**2.48**	**4.97**
Uranium	0.09	0.87	0.08	0.79					0.01	0.09	0.00	0.04	0.01	0.14	0.01	0.07
Vanadium	0.06	0.59	0.05	0.45					0.04	0.38	0.01	0.13	N/A	N/A	N/A	N/A
Zinc	0.00	0.05	0.00	0.03					0.16	**3.43**	0.05	**1.08**	0.36	**7.66**	0.20	**4.25**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 30. Summary of Hazard Quotient Calculations
AOI: Middle Blue Creek PIA, Riparian Drainage
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ
Antimony	0.00	0.05	0.00	0.03					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.01	0.00	0.01					0.03	0.11	0.01	0.03	0.06	0.23	0.03	0.11
Beryllium	0.00	0.01	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.02	0.00	0.01					0.04	0.17	0.01	0.04	0.27	**1.08**	0.18	0.72
Cobalt	0.00	0.01	0.00	0.01					0.05	0.09	0.01	0.02	0.07	0.13	0.02	0.04
Copper	0.00	0.00	0.00	0.00					0.05	0.06	0.01	0.01	0.25	0.31	0.16	0.20
Manganese	0.05	0.16	0.02	0.07					0.05	0.46	0.01	0.09	0.19	**1.87**	0.12	**1.15**
Molybdenum	0.00	0.03	0.00	0.01					0.00	0.05	0.00	0.01	N/A	N/A	N/A	N/A
Nickel	0.00	0.01	0.00	0.00					0.08	0.11	0.02	0.02	0.16	0.22	0.08	0.11
Selenium	0.01	0.06	0.00	0.04					0.05	0.10	0.01	0.02	0.22	0.43	0.14	0.27
Uranium	0.03	0.33	0.02	0.25					0.00	0.03	0.00	0.01	0.01	0.10	0.01	0.06
Vanadium	0.04	0.35	0.02	0.23					0.02	0.22	0.01	0.06	N/A	N/A	N/A	N/A
Zinc	0.00	0.02	0.00	0.01					0.06	**1.18**	0.01	0.29	0.31	**6.62**	0.21	**4.37**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Table R 31. Summary of Hazard Quotient Calculations
AOI: Lower Blue Creek PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL
Analyte	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ	HQ
Antimony	0.01	0.06	0.00	0.04					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.02	0.00	0.01					0.05	0.18	0.02	0.07	0.07	0.30	0.04	0.16
Beryllium	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.00	0.02	0.00	0.01	0.23	0.93	0.17	0.69
Cobalt	0.00	0.00	0.00	0.00					0.01	0.02	0.00	0.01	0.03	0.06	0.02	0.03
Copper	0.00	0.00	0.00	0.00					0.03	0.04	0.01	0.02	0.24	0.29	0.17	0.20
Manganese	0.01	0.02	0.00	0.02					0.01	0.05	0.00	0.02	0.15	**1.47**	0.11	**1.08**
Molybdenum	0.00	0.00	0.00	0.00					0.00	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00					0.01	0.02	0.01	0.01	0.10	0.13	0.07	0.09
Selenium	0.00	0.04	0.00	0.03					0.04	0.08	0.02	0.03	0.21	0.41	0.14	0.28
Uranium	0.01	0.06	0.01	0.06					0.00	0.01	0.00	0.00	0.01	0.07	0.01	0.05
Vanadium	0.03	0.27	0.02	0.24					0.02	0.17	0.01	0.07	N/A	N/A	N/A	N/A
Zinc	0.00	0.01	0.00	0.01					0.02	0.47	0.01	0.19	0.28	**5.91**	0.20	**4.27**

AOI: Area of interest
LOAEL: Lowest observable adverse effect level
HQ: Hazard quotient
NOAEL: No observable adverse effect level
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ ≥ 1.0

Appendix S - Summary Tables of Total Ionizing Radiation
Midnite Mine Site
Wellpinit, Washington

Table S-1. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Composite Sediment**						
Radium 226	3	2	0.27	8.73E+00	0.0304	0.0304	Radium 226	1	1	6.91	1.14E+04	0.0006	0.0006
Radium 228	3	0	0	9.34E+00	0.0000	0.0000	Radium 228	1	1	1.68	1.07E+04	0.0002	0.0002
Thorium 232	3	0	0	3.32E+02	0.0000	0.0000	Thorium 232	1	1	0.95	1.07E+04	0.0001	0.0001
Uranium 234	3	3	43.03	2.02E+02	0.2130	0.2130	Uranium 234	1	1	11.90	2.94E+06	0.0000	0.0000
Uranium 235	3	3	1.86	2.21E+02	0.0084	0.0084	Uranium 235	1	1	0.74	1.03E+05	0.0000	0.0000
Uranium 238	3	3	39.63	2.27E+02	0.1746	0.1746	Uranium 238	1	1	10.60	4.28E+04	0.0002	0.0002
Sum-of-the-Fractions					0.4265		**Sum-of-the-Fractions**					0.0011	
Total Ionizing Radiation in Water (rad/day)						0.4265	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0011

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.4**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-2. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Western Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Partial Fraction (rad/day)**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Partial Fraction (rad/day)**
Surface Water							**Composite Sediment**						
Radium 226	18	18	0.91	8.73E+00	0.1046	0.1046	Radium 226	3	3	4.34	1.14E+04	0.0004	0.0004
Radium 228	16	13	1.16	9.34E+00	0.1244	0.1244	Radium 228	3	3	3.47	1.07E+04	0.0003	0.0003
Thorium 232	3	2	0.08	3.32E+02	0.0002	0.0002	Thorium 232	3	3	3.42	1.07E+04	0.0003	0.0003
Uranium 234	17	16	20.01	2.02E+02	0.0990	0.0990	Uranium 234	3	3	39.20	2.94E+06	0.0000	0.0000
Uranium 235	15	14	1.94	2.21E+02	0.0088	0.0088	Uranium 235	3	3	2.32	1.03E+05	0.0000	0.0000
Uranium 238	17	16	17.81	2.27E+02	0.0784	0.0784	Uranium 238	3	3	36.20	4.28E+04	0.0008	0.0008
Sum-of-the-Fractions					0.4155		**Sum-of-the-Fractions**					0.0019	
Total Ionizing Radiation in Water (rad/day)						0.4155	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0019

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.4**

Result: Does not exceed the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-3. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Northeastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	1	1	13.40	8.73E+00	1.5349	1.5349	Radium 226	2	2	39.25	1.14E+04	0.0034	0.0034
Radium 228	1	1	1.43	9.34E+00	0.1531	0.1531	Radium 228	2	2	2.30	1.07E+04	0.0002	0.0002
Thorium 232	1	1	10.50	3.32E+02	0.0316	0.0316	Thorium 232	2	2	2.39	1.07E+04	0.0002	0.0002
Uranium 234	1	1	295.00	2.02E+02	1.4604	1.4604	Uranium 234	2	2	36.50	2.94E+06	0.0000	0.0000
Uranium 235	1	1	19.00	2.21E+02	0.0860	0.0860	Uranium 235	2	2	2.20	1.03E+05	0.0000	0.0000
Uranium 238	1	1	357.00	2.27E+02	1.5727	1.5727	Uranium 238	2	2	38.60	4.28E+04	0.0009	0.0009
Sum-of-the-Fractions					4.8387		**Sum-of-the-Fractions**					0.0048	
Total Ionizing Radiation in Water (rad/day)						4.8387	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0048

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **4.8**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-4. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Central Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	18	18	0.79	8.73E+00	0.0905	0.0905	Radium 226	2	2	6.35	1.14E+04	0.0006	0.0006
Radium 228	16	12	1.05	9.34E+00	0.1122	0.1122	Radium 228	2	2	2.64	1.07E+04	0.0002	0.0002
Thorium 232	3	1	0.04	3.32E+02	0.0001	0.0001	Thorium 232	2	2	3.01	1.07E+04	0.0003	0.0003
Uranium 234	17	17	269.68	2.02E+02	1.3350	1.3350	Uranium 234	2	2	219.35	2.94E+06	0.0001	0.0001
Uranium 235	17	16	10.89	2.21E+02	0.0493	0.0493	Uranium 235	2	2	12.61	1.03E+05	0.0001	0.0001
Uranium 238	17	16	254.82	2.27E+02	1.1226	1.1226	Uranium 238	2	2	207.00	4.28E+04	0.0048	0.0048
Sum-of-the-Fractions					2.7097		**Sum-of-the-Fractions**					0.0061	
Total Ionizing Radiation in Water (rad/day)						2.7097	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0061

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **2.7**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-5. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Waterand Composite Sediment for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water						
Radium 226	39	39	*0.99*	8.73E+00	0.1134	0.1134
Radium 228	36	19	0.74	9.34E+00	0.0787	0.0787
Thorium 232	16	6	0.03	3.32E+02	0.0001	0.0001
Uranium 234	37	36	*20.70*	2.02E+02	0.1025	0.1025
Uranium 235	35	33	*0.83*	2.21E+02	0.0038	0.0038
Uranium 238	37	37	*18.00*	2.27E+02	0.0793	0.0793
Sum-of-the-Fractions					0.3777	
Total Ionizing Radiation in Water (rad/day)						0.3777

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Composite Sediment						
Radium 226	6	6	10.50	1.14E+04	0.0009	0.0009
Radium 228	6	5	2.08	1.07E+04	0.0002	0.0002
Thorium 232	6	6	1.58	1.07E+04	0.0001	0.0001
Uranium 234	6	6	16.35	2.94E+06	0.0000	0.0000
Uranium 235	6	6	0.99	1.03E+05	0.0000	0.0000
Uranium 238	6	6	13.94	4.28E+04	0.0003	0.0003
Sum-of-the-Fractions					0.0016	
Total Ionizing Radiation in Composite Sediment (rad/day)						0.0016

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.4**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-6. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	16	14	0.55	8.73E+00	0.0625	0.0625	Radium 226	1	1	20	1.14E+04	0.0018	0.0018
Radium 228	15	8	0.53	9.34E+00	0.0562	0.0562	Radium 228	1	1	9.39	1.07E+04	0.0009	0.0009
Thorium 232	6	3	0.02	3.32E+02	0.0001	0.0001	Thorium 232	1	1	2.72	1.07E+04	0.0003	0.0003
Uranium 234	15	14	22.47	2.02E+02	0.1112	0.1112	Uranium 234	1	1	50	2.94E+06	0.0000	0.0000
Uranium 235	13	12	1.37	2.21E+02	0.0062	0.0062	Uranium 235	1	1	4.83	1.03E+05	0.0000	0.0000
Uranium 238	15	15	21.77	2.27E+02	0.0959	0.0959	Uranium 238	1	1	45.7	4.28E+04	0.0011	0.0011
Sum-of-the-Fractions					0.3321		**Sum-of-the-Fractions**					0.0040	
Total Ionizing Radiation in Water (rad/day)						0.3321	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0040

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.3**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-7. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide [1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Composite Sediment**						
Radium 226	15	14	0.41	8.73E+00	0.0465	0.0465	Radium 226	1	1	3.42	1.14E+04	0.0003	0.0003
Radium 228	13	10	1.15	9.34E+00	0.1235	0.1235	Radium 228	1	1	2.61	1.07E+04	0.0002	0.0002
Thorium 232	3	2	0.10	3.32E+02	0.0003	0.0003	Thorium 232	1	1	4.86	1.07E+04	0.0005	0.0005
Uranium 234	14	14	8.44	2.02E+02	0.0418	0.0418	Uranium 234	1	1	3.62	2.94E+06	0.0000	0.0000
Uranium 235	12	11	2.25	2.21E+02	0.0102	0.0102	Uranium 235	1	1	0.223	1.03E+05	0.0000	0.0000
Uranium 238	14	12	3.93	2.27E+02	0.0173	0.0173	Uranium 238	1	1	3.38	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.2396		**Sum-of-the-Fractions**					0.0011	
Total Ionizing Radiation in Water (rad/day)						0.2396	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0011

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-8. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water						
Radium 226	30	25	*0.46*	8.73E+00	0.0521	0.0521
Radium 228	29	18	*0.62*	9.34E+00	0.0664	0.0664
Thorium 232	9	3	0.05	3.32E+02	0.0002	0.0002
Uranium 234	29	28	*8.80*	2.02E+02	0.0436	0.0436
Uranium 235	26	23	*0.45*	2.21E+02	0.0020	0.0020
Uranium 238	29	29	*8.26*	2.27E+02	0.0364	0.0364
Sum-of-the-Fractions					0.2006	
Total Ionizing Radiation in Water (rad/day)						0.2006

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Composite Sediment						
Radium 226	2	2	4.83	1.14E+04	0.0004	0.0004
Radium 228	2	2	5.40	1.07E+04	0.0005	0.0005
Thorium 232	2	2	2.61	1.07E+04	0.0002	0.0002
Uranium 234	2	2	4.25	2.94E+06	0.0000	0.0000
Uranium 235	2	2	0.20	1.03E+05	0.0000	0.0000
Uranium 238	2	2	3.95	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0013	
Total Ionizing Radiation in Composite Sediment (rad/day)						0.0013

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-9. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	9	5	0.23	8.73E+00	0.0260	0.0260	Radium 226	2	2	1.60	1.14E+04	0.0001	0.0001
Radium 228	9	5	0.82	9.34E+00	0.0881	0.0881	Radium 228	2	2	1.55	1.07E+04	0.0001	0.0001
Thorium 232	9	3	0.06	3.32E+02	0.0002	0.0002	Thorium 232	2	2	1.42	1.07E+04	0.0001	0.0001
Uranium 234	9	9	5.08	2.02E+02	0.0252	0.0252	Uranium 234	2	2	2.61	2.94E+06	0.0000	0.0000
Uranium 235	9	6	0.20	2.21E+02	0.0009	0.0009	Uranium 235	2	1	0.07	1.03E+05	0.0000	0.0000
Uranium 238	9	9	4.19	2.27E+02	0.0184	0.0184	Uranium 238	2	2	2.32	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.1588		**Sum-of-the-Fractions**					0.0005	
Total Ionizing Radiation in Water (rad/day)						0.1588	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0005

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-10. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Franklin D. Roosevelt Lake
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	1	0	0	8.73E+00	0.0000	0.0000	Radium 226	1	1	1.41	1.14E+04	0.0001	0.0001
Radium 228	1	0	0	9.34E+00	0.0000	0.0000	Radium 228	1	1	1.67	1.07E+04	0.0002	0.0002
Thorium 232	1	0	0	3.32E+02	0.0000	0.0000	Thorium 232	1	1	1.01	1.07E+04	0.0001	0.0001
Uranium 234	1	0	0	2.02E+02	0.0000	0.0000	Uranium 234	1	1	0.69	2.94E+06	0.0000	0.0000
Uranium 235	1	0	0	2.21E+02	0.0000	0.0000	Uranium 235	1	1	0.05	1.03E+05	0.0000	0.0000
Uranium 238	1	0	0	2.27E+02	0.0000	0.0000	Uranium 238	1	1	0.63	4.28E+04	0.0000	0.0000
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0004	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0004

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.0**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-11. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Composite Sediment for Background
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Composite Sediment**						
Radium 226	40	40	*0.38*	8.73E+00	0.0439	0.0439	Radium 226	22	22	*3.02*	1.14E+04	0.0003	0.0003
Radium 228	40	13	0.38	9.34E+00	0.0404	0.0404	Radium 228	22	22	*2.05*	1.07E+04	0.0002	0.0002
Thorium 232	38	26	*0.04*	3.32E+02	0.0001	0.0001	Thorium 232	22	22	*1.53*	1.07E+04	0.0001	0.0001
Uranium 234	59	57	*0.75*	2.02E+02	0.0037	0.0037	Uranium 234	22	22	*4.14*	2.94E+06	0.0000	0.0000
Uranium 235	59	37	*0.05*	2.21E+02	0.0002	0.0002	Uranium 235	22	20	*0.19*	1.03E+05	0.0000	0.0000
Uranium 238	59	56	*0.60*	2.27E+02	0.0026	0.0026	Uranium 238	22	22	*3.32*	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0911		**Sum-of-the-Fractions**					0.0007	
Total Ionizing Radiation in Water (rad/day)						0.0911	**Total Ionizing Radiation in Composite Sediment (rad/day)**						0.0007

Total Ionizing Radiation in Water plus Composite Sediment (rad/day): **0.1**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-12. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Pit 3
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Grab Sediment**						
Radium 226	14	14	42.08	8.73E+00	4.8200	4.8200	Radium 226	2	0	0.00	1.14E+04	0.0000	0.0000
Radium 228	14	12	3.29	9.34E+00	0.3517	0.3517	Radium 228	2	2	4.59	1.07E+04	0.0004	0.0004
Thorium 232	4	3	23.55	3.32E+02	0.0709	0.0709	Thorium 232	2	0	0.00	1.07E+04	0.0000	0.0000
Uranium 234	14	14	5505.71	2.02E+02	27.2560	27.2560	Uranium 234	2	2	190.55	2.94E+06	0.0001	0.0001
Uranium 235	14	13	257.79	2.21E+02	1.1665	1.1665	Uranium 235	2	2	5.85	1.03E+05	0.0001	0.0001
Uranium 238	14	14	5704.29	2.27E+02	25.1290	25.1290	Uranium 238	2	2	198.50	4.28E+04	0.0046	0.0046
Sum-of-the-Fractions					58.7941		**Sum-of-the-Fractions**					0.0052	
Total Ionizing Radiation in Water (rad/day)						58.7941	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0052

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **58.8**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-13. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Pit 4
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	13	13	4.12	9.E+00	0.4721	0.4721	Radium 226	3	3	19.32	1.E+04	0.0017	0.0017
Radium 228	11	6	0.56	9.E+00	0.0602	0.0602	Radium 228	3	3	3.34	1.E+04	0.0003	0.0003
Thorium 232	3	2	1.80	3.E+02	0.0054	0.0054	Thorium 232	3	1	0.48	1.E+04	0.0000	0.0000
Uranium 234	12	12	996.83	2.E+02	4.9348	4.9348	Uranium 234	3	3	168.80	3.E+06	0.0001	0.0001
Uranium 235	12	12	38.72	2.E+02	0.1752	0.1752	Uranium 235	3	3	7.61	1.E+05	0.0001	0.0001
Uranium 238	12	12	818.00	2.E+02	3.6035	3.6035	Uranium 238	3	3	129.93	4.E+04	0.0030	0.0030
Sum-of-the-Fractions					9.2512		**Sum-of-the-Fractions**					0.0052	
Total Ionizing Radiation in Water (rad/day)						9.2512	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0052

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **9.3**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-14. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Pollution Control Pond
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Grab Sediment						
Radium 226	20	20	*14.15*	8.73E+00	1.6208	1.6208	Radium 226	2	1	2.96	1.14E+04	0.0003	0.0003
Radium 228	19	17	3.68	9.34E+00	0.3937	0.3937	Radium 228	2	2	11.66	1.07E+04	0.0011	0.0011
Thorium 232	3	3	70.67	3.32E+02	0.2129	0.2129	Thorium 232	2	2	29.77	1.07E+04	0.0028	0.0028
Uranium 234	19	19	5920.53	2.02E+02	29.3095	29.3095	Uranium 234	2	2	1213.86	2.94E+06	0.0004	0.0004
Uranium 235	19	18	235.16	2.21E+02	1.0641	1.0641	Uranium 235	2	2	57.97	1.03E+05	0.0006	0.0006
Uranium 238	19	19	5990.53	2.27E+02	26.3900	26.3900	Uranium 238	2	2	1178.63	4.28E+04	0.0275	0.0275
Sum-of-the-Fractions					58.9909		**Sum-of-the-Fractions**					0.0326	
Total Ionizing Radiation in Water (rad/day)						58.9909	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0326

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **59.0**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-15. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Blood Pool
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water						
Radium 226	7	7	4.05	8.73E+00	0.4639	0.4639
Radium 228	6	6	1.90	9.34E+00	0.2031	0.2031
Thorium 232	2	0	0.00	3.32E+02	0.0000	0.0000
Uranium 234	7	7	1585.00	2.02E+02	7.8465	7.8465
Uranium 235	7	7	123.57	2.21E+02	0.5591	0.5591
Uranium 238	7	7	1643.29	2.27E+02	7.2391	7.2391
Sum-of-the-Fractions					16.3118	
Total Ionizing Radiation in Water (rad/day)						16.3118

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Grab Sediment						
Radium 226	2	1	17.60	1.14E+04	0.0015	0.0015
Radium 228	2	2	5.07	1.07E+04	0.0005	0.0005
Thorium 232	2	2	1.70	1.07E+04	0.0002	0.0002
Uranium 234	2	2	29.57	2.94E+06	0.0000	0.0000
Uranium 235	2	0	nd	1.03E+05	#VALUE!	
Uranium 238	2	2	22.74	4.28E+04	0.0005	0.0005
Sum-of-the-Fractions					#VALUE!	
Total Ionizing Radiation in Grab Sediment (rad/day)						0.0027

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **16.3**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-16. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Outfall Pond
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Grab Sediment**						
Radium 226	3	2	0.27	8.73E+00	0.0304	0.0304	Radium 226	1	0	0.00	1.14E+04	0.0000	0.0000
Radium 228	3	0	0.00	9.34E+00	0.0000	0.0000	Radium 228	1	1	5.10	1.07E+04	0.0005	0.0005
Thorium 232	3	0	0.00	3.32E+02	0.0000	0.0000	Thorium 232	1	1	4.52	1.07E+04	0.0004	0.0004
Uranium 234	3	3	43.03	2.02E+02	0.2130	0.2130	Uranium 234	1	1	126.10	2.94E+06	0.0000	0.0000
Uranium 235	3	3	1.86	2.21E+02	0.0084	0.0084	Uranium 235	1	1	5.41	1.03E+05	0.0001	0.0001
Uranium 238	3	3	39.63	2.27E+02	0.1746	0.1746	Uranium 238	1	1	136.60	4.28E+04	0.0032	0.0032
Sum-of-the-Fractions					0.4265		**Sum-of-the-Fractions**					0.0042	
Total Ionizing Radiation in Water (rad/day)						0.4265	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0042

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.4**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-17. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Western Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	18	18	0.91	8.73E+00	0.1046	0.1046	Radium 226	3	1	1.00	1.14E+04	0.0001	0.0001
Radium 228	16	13	1.16	9.34E+00	0.1244	0.1244	Radium 228	3	3	2.86	1.07E+04	0.0003	0.0003
Thorium 232	3	2	0.08	3.32E+02	0.0002	0.0002	Thorium 232	3	3	1.80	1.07E+04	0.0002	0.0002
Uranium 234	17	16	20.01	2.02E+02	0.0990	0.0990	Uranium 234	9	9	59.33	2.94E+06	0.0000	0.0000
Uranium 235	15	14	1.94	2.21E+02	0.0088	0.0088	Uranium 235	9	8	2.48	1.03E+05	0.0000	0.0000
Uranium 238	17	16	17.81	2.27E+02	0.0784	0.0784	Uranium 238	9	9	56.52	4.28E+04	0.0013	0.0013
Sum-of-the-Fractions					0.4155		**Sum-of-the-Fractions**					0.0019	
Total Ionizing Radiation in Water (rad/day)						0.4155	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0019

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.4**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-18. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Central Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	18	18	0.79	8.73E+00	0.0905	0.0905	Radium 226	2	0	0.00	1.14E+04	0.0000	0.0000
Radium 228	16	12	1.05	9.34E+00	0.1122	0.1122	Radium 228	2	2	5.06	1.07E+04	0.0005	0.0005
Thorium 232	3	1	0.04	3.32E+02	0.0001	0.0001	Thorium 232	2	1	0.72	1.07E+04	0.0001	0.0001
Uranium 234	17	17	269.68	2.02E+02	1.3350	1.3350	Uranium 234	2	2	555.35	2.94E+06	0.0002	0.0002
Uranium 235	17	16	10.89	2.21E+02	0.0493	0.0493	Uranium 235	2	2	12.72	1.03E+05	0.0001	0.0001
Uranium 238	17	16	254.82	2.27E+02	1.1226	1.1226	Uranium 238	2	2	578.35	4.28E+04	0.0135	0.0135
Sum-of-the-Fractions					2.7097		**Sum-of-the-Fractions**					0.0144	
Total Ionizing Radiation in Water (rad/day)						2.7097	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0144

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **2.7**

Result: Exceeds the 1.0 rad/day criteria for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-19. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	39	39	*0.99*	8.73E+00	0.1134	0.1134	Radium 226	3	1	1.13	1.14E+04	0.0001	0.0001
Radium 228	36	19	0.74	9.34E+00	0.0787	0.0787	Radium 228	3	3	3.23	1.07E+04	0.0003	0.0003
Thorium 232	16	6	0.03	3.32E+02	0.0001	0.0001	Thorium 232	3	2	1.83	1.07E+04	0.0002	0.0002
Uranium 234	37	36	*20.70*	2.02E+02	0.1025	0.1025	Uranium 234	7	7	6.81	2.94E+06	0.0000	0.0000
Uranium 235	35	33	*0.83*	2.21E+02	0.0038	0.0038	Uranium 235	7	7	0.33	1.03E+05	0.0000	0.0000
Uranium 238	37	37	*18.00*	2.27E+02	0.0793	0.0793	Uranium 238	7	7	6.65	4.28E+04	0.0002	0.0002
Sum-of-the-Fractions					0.3777		**Sum-of-the-Fractions**					0.0007	
Total Ionizing Radiation in Water (rad/day)						0.3777	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0007

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.4**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-20. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	16	14	0.55	8.73E+00	0.0625	0.0625	Radium 226	2	1	3.71	1.14E+04	0.0003	0.0003
Radium 228	15	8	0.53	9.34E+00	0.0562	0.0562	Radium 228	2	2	4.47	1.07E+04	0.0004	0.0004
Thorium 232	6	3	0.02	3.32E+02	0.0001	0.0001	Thorium 232	2	2	1.61	1.07E+04	0.0002	0.0002
Uranium 234	15	14	22.47	2.02E+02	0.1112	0.1112	Uranium 234	4	4	16.88	2.94E+06	0.0000	0.0000
Uranium 235	13	12	1.37	2.21E+02	0.0062	0.0062	Uranium 235	4	4	0.81	1.03E+05	0.0000	0.0000
Uranium 238	15	15	21.77	2.27E+02	0.0959	0.0959	Uranium 238	4	4	17.66	4.28E+04	0.0004	0.0004
Sum-of-the-Fractions					0.3321		**Sum-of-the-Fractions**					0.0013	
Total Ionizing Radiation in Water (rad/day)						0.3321	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0013

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.3**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-21. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Upper Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	15	14	0.41	8.73E+00	0.0465	0.0465	Radium 226	1	1	2.69	1.14E+04	0.0002	0.0002
Radium 228	13	10	1.15	9.34E+00	0.1235	0.1235	Radium 228	1	1	4.42	1.07E+04	0.0004	0.0004
Thorium 232	3	2	0.10	3.32E+02	0.0003	0.0003	Thorium 232	1	1	2.05	1.07E+04	0.0002	0.0002
Uranium 234	14	14	8.44	2.02E+02	0.0418	0.0418	Uranium 234	10	10	3.75	2.94E+06	0.0000	0.0000
Uranium 235	12	11	2.25	2.21E+02	0.0102	0.0102	Uranium 235	10	10	0.27	1.03E+05	0.0000	0.0000
Uranium 238	14	12	3.93	2.27E+02	0.0173	0.0173	Uranium 238	10	10	3.22	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.2396		**Sum-of-the-Fractions**					0.0009	
Total Ionizing Radiation in Water (rad/day)						0.2396	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0009

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-22. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	30	25	*0.46*	8.73E+00	0.0521	0.0521	Radium 226	5	2	1.03	1.14E+04	0.0001	0.0001
Radium 228	29	18	*0.62*	9.34E+00	0.0664	0.0664	Radium 228	5	5	4.20	1.07E+04	0.0004	0.0004
Thorium 232	9	3	0.05	3.32E+02	0.0002	0.0002	Thorium 232	5	5	1.47	1.07E+04	0.0001	0.0001
Uranium 234	29	28	*8.80*	2.02E+02	0.0436	0.0436	Uranium 234	17	17	6.18	2.94E+06	0.0000	0.0000
Uranium 235	26	23	*0.45*	2.21E+02	0.0020	0.0020	Uranium 235	17	16	0.30	1.03E+05	0.0000	0.0000
Uranium 238	29	29	*8.26*	2.27E+02	0.0364	0.0364	Uranium 238	17	17	5.87	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.2006		**Sum-of-the-Fractions**					0.0008	
Total Ionizing Radiation in Water (rad/day)						0.2006	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0008

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-23. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	9	5	0.23	8.73E+00	0.0260	0.0260	Radium 226	4	0	0.00	1.14E+04	0.0000	0.0000
Radium 228	9	5	0.82	9.34E+00	0.0881	0.0881	Radium 228	4	4	4.04	1.07E+04	0.0004	0.0004
Thorium 232	9	3	0.06	3.32E+02	0.0002	0.0002	Thorium 232	4	4	1.60	1.07E+04	0.0001	0.0001
Uranium 234	9	9	5.08	2.02E+02	0.0252	0.0252	Uranium 234	4	2	3.97	2.94E+06	0.0000	0.0000
Uranium 235	9	6	0.20	2.21E+02	0.0009	0.0009	Uranium 235	4	2	0.22	1.03E+05	0.0000	0.0000
Uranium 238	9	9	4.19	2.27E+02	0.0184	0.0184	Uranium 238	4	2	3.55	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.1588		**Sum-of-the-Fractions**					0.0006	
Total Ionizing Radiation in Water (rad/day)						0.1588	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0006

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.2**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-24. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Franklin D. Roosevelt Lake
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Grab Sediment**						
Radium 226	1	0	0	8.73E+00	0.0000	0.0000	Radium 226	1	1	1.74	1.14E+04	0.0002	0.0002
Radium 228	1	0	0	9.34E+00	0.0000	0.0000	Radium 228	1	1	1.65	1.07E+04	0.0002	0.0002
Thorium 232	1	0	0	3.32E+02	0.0000	0.0000	Thorium 232	1	1	0.59	1.07E+04	0.0001	0.0001
Uranium 234	1	0	0	2.02E+02	0.0000	0.0000	Uranium 234	1	0	0.00	2.94E+06	0.0000	0.0000
Uranium 235	1	0	0	2.21E+02	0.0000	0.0000	Uranium 235	1	0	0.00	1.03E+05	0.0000	0.0000
Uranium 238	1	0	0	2.27E+02	0.0000	0.0000	Uranium 238	1	0	0.00	4.28E+04	0.0000	0.0000
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0004	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Grab Sediment (rad/day)**						0.0004

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.0**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-25. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Grab Sediment for Background
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water						
Radium 226	40	40	*0.38*	8.73E+00	0.0439	0.0439
Radium 228	40	13	0.38	9.34E+00	0.0404	0.0404
Thorium 232	38	26	*0.04*	3.32E+02	0.0001	0.0001
Uranium 234	59	57	*0.75*	2.02E+02	0.0037	0.0037
Uranium 235	59	37	*0.05*	2.21E+02	0.0002	0.0002
Uranium 238	59	56	*0.60*	2.27E+02	0.0026	0.0026
Sum-of-the-Fractions					0.0911	
Total Ionizing Radiation in Water (rad/day)						0.0911

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Grab Sediment						
Radium 226	21	21	*2.81*	1.14E+04	0.0002	0.0002
Radium 228	22	22	*2.19*	1.07E+04	0.0002	0.0002
Thorium 232	22	22	*1.53*	1.07E+04	0.0001	0.0001
Uranium 234	22	22	*4.21*	2.94E+06	0.0000	0.0000
Uranium 235	22	21	*0.26*	1.03E+05	0.0000	0.0000
Uranium 238	22	22	*3.44*	4.28E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0007	
Total Ionizing Radiation in Grab Sediment (rad/day)						0.0007

Total Ionizing Radiation in Water plus Grab Sediment (rad/day): **0.1**

Result: Does not exceed the 1.0 rad/day for aquatic animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-26. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Riparian Sediment for Western Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Riparian Sediment**						
Radium 226	18	18	0.91	3.49E+00	0.2617	0.0262	Radium 226	6	6	11.80	8.61E+01	0.1370	0.0137
Radium 228	16	13	1.16	3.74E+00	0.3106	0.0311	Radium 228	4	4	3.27	9.12E+01	0.0358	0.0036
Thorium 232	3	2	0.08	1.83E+03	0.0000	0.0000	Thorium 232	4	4	2.45	6.11E+02	0.0040	0.0004
Uranium 234	17	16	20.01	6.84E+02	0.0292	0.0029	Uranium 234	4	4	29.93	5.27E+03	0.0057	0.0006
Uranium 235	15	14	1.94	7.47E+02	0.0026	0.0003	Uranium 235	4	4	1.79	3.74E+03	0.0005	0.0000
Uranium 238	17	16	17.81	7.68E+02	0.0232	0.0023	Uranium 238	4	4	28.75	2.50E+03	0.0115	0.0012
Sum-of-the-Fractions					0.6274		**Sum-of-the-Fractions**					0.1945	
Total Ionizing Radiation in Water (rad/day)						0.0627	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0195

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.1**

Result: Does not exceed the 0.1 rad/day for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-27. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Riparian Sediment for Central Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	18	18	0.79	3.49E+00	0.2264	0.0226	Radium 226	3	3	32.04	8.61E+01	0.3721	0.0372
Radium 228	16	12	1.05	3.74E+00	0.2802	0.0280	Radium 228	2	2	2.60	9.12E+01	0.0285	0.0029
Thorium 232	3	1	0.04	1.83E+03	0.0000	0.0000	Thorium 232	2	2	1.75	6.11E+02	0.0029	0.0003
Uranium 234	17	17	269.68	6.84E+02	0.3943	0.0394	Uranium 234	4	4	735.75	5.27E+03	0.1396	0.0140
Uranium 235	17	16	10.89	7.47E+02	0.0146	0.0015	Uranium 235	4	4	33.25	3.74E+03	0.0089	0.0009
Uranium 238	17	16	254.82	7.68E+02	0.3318	0.0332	Uranium 238	4	4	710.50	2.50E+03	0.2842	0.0284
Sum-of-the-Fractions					1.2473		**Sum-of-the-Fractions**					0.8362	
Total Ionizing Radiation in Water (rad/day)						0.1247	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0836

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.2**

Result: Exceeds the 0.1 rad/day criteria for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-28. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Riparian Sediment for Upper Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	39	39	*0.99*	3.49E+00	0.2837	0.0284	Radium 226	4	4	3.96	8.61E+01	0.0459	0.0046
Radium 228	36	19	0.74	3.74E+00	0.1966	0.0197	Radium 228	4	4	1.39	9.12E+01	0.0152	0.0015
Thorium 232	16	6	0.03	1.83E+03	0.0000	0.0000	Thorium 232	4	4	1.40	6.11E+02	0.0023	0.0002
Uranium 234	37	36	*20.70*	6.84E+02	0.0303	0.0030	Uranium 234	4	4	9.79	5.27E+03	0.0019	0.0002
Uranium 235	35	33	*0.83*	7.47E+02	0.0011	0.0001	Uranium 235	4	4	0.44	3.74E+03	0.0001	0.0000
Uranium 238	37	37	*18.00*	7.68E+02	0.0234	0.0023	Uranium 238	4	4	8.28	2.50E+03	0.0033	0.0003
Sum-of-the-Fractions					0.5350		**Sum-of-the-Fractions**					0.0687	
Total Ionizing Radiation in Water (rad/day)						0.0535	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0069

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.1**

Result: Does not exceed the 0.1 rad/day for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-29. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Riparian Sediment for Lower Eastern Drainage
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							Riparian Sediment						
Radium 226	16	14	0.55	3.49E+00	0.1563	0.0156	Radium 226	1	1	15.30	8.61E+01	0.1777	0.0178
Radium 228	15	8	0.53	3.74E+00	0.1404	0.0140	Radium 228	1	1	3.13	9.12E+01	0.0343	0.0034
Thorium 232	6	3	0.02	1.83E+03	0.0000	0.0000	Thorium 232[a]				6.11E+02	0.0000	0.0000
Uranium 234	15	14	22.47	6.84E+02	0.0328	0.0033	Uranium 234	2	2	44.90	5.27E+03	0.0085	0.0009
Uranium 235	13	12	1.37	7.47E+02	0.0018	0.0002	Uranium 235	2	2	2.12	3.74E+03	0.0006	0.0001
Uranium 238	15	15	21.77	7.68E+02	0.0283	0.0028	Uranium 238	2	2	41.45	2.50E+03	0.0166	0.0017
Sum-of-the-Fractions					0.3598		**Sum-of-the-Fractions**					0.2377	
Total Ionizing Radiation in Water (rad/day)						0.0360	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0238

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.1**

Result: Does not exceed the 0.1 rad/day for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
a. Not Analyzed
3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)
pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-30. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Riparian Sediment for Middle Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[3]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water							**Riparian Sediment**						
Radium 226	30	25	*0.46*	3.49E+00	0.1304	0.0130	Radium 226	4	4	4.68	8.61E+01	0.0544	0.0054
Radium 228	29	18	*0.62*	3.74E+00	0.1658	0.0166	Radium 228	4	4	3.79	9.12E+01	0.0416	0.0042
Thorium 232	9	3	0.05	1.83E+03	0.0000	0.0000	Thorium 232[a]				6.11E+02	0.0000	0.0000
Uranium 234	29	28	*8.80*	6.84E+02	0.0129	0.0013	Uranium 234	4	4	14.05	5.27E+03	0.0027	0.0003
Uranium 235	26	23	*0.45*	7.47E+02	0.0006	0.0001	Uranium 235	4	4	1.06	3.74E+03	0.0003	0.0000
Uranium 238	29	29	*8.26*	7.68E+02	0.0108	0.0011	Uranium 238	4	4	13.58	2.50E+03	0.0054	0.0005
Sum-of-the-Fractions					0.3204		**Sum-of-the-Fractions**					0.1043	
Total Ionizing Radiation in Water (rad/day)						0.0320	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0104

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

a. Not Analyzed

3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-31. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Riparian Sediment for Lower Blue Creek
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[3]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water							**Riparian Sediment**						
Radium 226	9	5	0.23	3.49E+00	0.0649	0.0065	Radium 226	1	1	1.44	8.61E+01	0.0167	0.0017
Radium 228	9	5	0.82	3.74E+00	0.2201	0.0220	Radium 228	1	1	1.82	9.12E+01	0.0200	0.0020
Thorium 232	9	3	0.06	1.83E+03	0.0000	0.0000	Thorium 232[a]				6.11E+02	0.0000	0.0000
Uranium 234	9	9	5.08	6.84E+02	0.0074	0.0007	Uranium 234	1	1	2.84	5.27E+03	0.0005	0.0001
Uranium 235	9	6	0.20	7.47E+02	0.0003	0.0000	Uranium 235	1	1	0.16	3.74E+03	0.0000	0.0000
Uranium 238	9	9	4.19	7.68E+02	0.0055	0.0005	Uranium 238	1	1	2.88	2.50E+03	0.0012	0.0001
Sum-of-the-Fractions					0.2982		**Sum-of-the-Fractions**					0.0384	
Total Ionizing Radiation in Water (rad/day)						0.0298	**Total Ionizing Radiation in Riparian Sediment (rad/day)**						0.0038

Total Ionizing Radiation in Water plus Riparian Sediment (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day for riparian animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).

a. Not Analyzed

3. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-32. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of Mined Area for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	14	14	42.08	6.94E+03	0.0061	0.0006	Radium 226	119	114	*29.89*	4.31E+01	0.6935	0.0069
Radium 228	14	12	3.29	7.42E+03	0.0004	0.0000	Radium 228	27	24	*3.01*	4.56E+01	0.0660	0.0007
Thorium 232	4	3	23.55	5.55E+04	0.0004	0.0000	Thorium 232	27	15	2.76	4.05E+02	0.0068	0.0001
Uranium 234	14	14	5505.71	4.05E+05	0.0136	0.0014	Uranium 234	83	83	*19.20*	5.13E+03	0.0037	0.0000
Uranium 235	14	13	257.79	4.25E+05	0.0006	0.0001	Uranium 235	83	72	*0.82*	2.67E+03	0.0003	0.0000
Uranium 238	14	14	5704.29	4.12E+05	0.0138	0.0014	Uranium 238	83	83	*20.44*	1.58E+03	0.0129	0.0001
Sum-of-the-Fractions					0.0350		**Sum-of-the-Fractions**					0.7833	
Total Ionizing Radiation in Water (rad/day)						0.0035	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0078

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Pit 3
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-33. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil for Northeast Area of PIA for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	1	1	13.40	6.94E+03	0.0019	0.0002	Radium 226	27	27	*3.74*	4.31E+01	0.0868	0.0009
Radium 228	1	1	1.43	7.42E+03	0.0002	0.0000	Radium 228	16	16	1.24	4.56E+01	0.0271	0.0003
Thorium 232	1	1	10.50	5.55E+04	0.0002	0.0000	Thorium 232	16	16	1.07	4.05E+02	0.0027	0.0000
Uranium 234	1	1	295.00	4.05E+05	0.0007	0.0001	Uranium 234	21	21	*2.37*	5.13E+03	0.0005	0.0000
Uranium 235	1	1	19.00	4.25E+05	0.0000	0.0000	Uranium 235	21	20	*0.15*	2.67E+03	0.0001	0.0000
Uranium 238	1	1	357.00	4.12E+05	0.0009	0.0001	Uranium 238	21	21	*2.35*	1.58E+03	0.0015	0.0000
Sum-of-the-Fractions					0.0040		**Sum-of-the-Fractions**					0.1186	
Total Ionizing Radiation in Water (rad/day)						0.0004	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0012

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.00**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-34. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil for Southwest Area of PIA for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	0.91	6.94E+03	0.0001	0.0000	Radium 226	18	18	3.29	4.31E+01	0.0764	0.0008
Radium 228	16	13	1.16	7.42E+03	0.0002	0.0000	Radium 228	16	16	1.83	4.56E+01	0.0401	0.0004
Thorium 232	3	2	0.08	5.55E+04	0.0000	0.0000	Thorium 232	16	16	1.40	4.05E+02	0.0035	0.0000
Uranium 234	17	16	20.01	4.05E+05	0.0000	0.0000	Uranium 234	16	16	2.11	5.13E+03	0.0004	0.0000
Uranium 235	15	14	1.94	4.25E+05	0.0000	0.0000	Uranium 235	16	15	0.12	2.67E+03	0.0000	0.0000
Uranium 238	17	16	17.81	4.12E+05	0.0000	0.0000	Uranium 238	16	16	2.05	1.58E+03	0.0013	0.0000
Sum-of-the-Fractions					0.0004		**Sum-of-the-Fractions**					0.1217	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0012

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.00**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-35. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of East Haul Road for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	39	39	*0.99*	6.94E+03	0.0001	0.0000	Radium 226	19	19	16.57	4.31E+01	0.3844	0.0038
Radium 228	36	19	0.74	7.42E+03	0.0001	0.0000	Radium 228	12	12	2.14	4.56E+01	0.0470	0.0005
Thorium 232	16	6	0.03	5.55E+04	0.0000	0.0000	Thorium 232	12	12	1.87	4.05E+02	0.0046	0.0000
Uranium 234	37	36	*20.70*	4.05E+05	0.0001	0.0000	Uranium 234	17	17	13.45	5.13E+03	0.0026	0.0000
Uranium 235	35	33	*0.83*	4.25E+05	0.0000	0.0000	Uranium 235	17	16	0.86	2.67E+03	0.0003	0.0000
Uranium 238	37	37	*18.00*	4.12E+05	0.0000	0.0000	Uranium 238	17	17	12.66	1.58E+03	0.0080	0.0001
Sum-of-the-Fractions					0.0003		**Sum-of-the-Fractions**					0.4469	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0045

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-36. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of West Haul Road for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	0.91	6.94E+03	0.0001	0.0000	Radium 226	6	6	39.29	4.31E+01	0.9117	0.0091
Radium 228	16	13	1.16	7.42E+03	0.0002	0.0000	Radium 228	4	4	2.27	4.56E+01	0.0497	0.0005
Thorium 232	3	2	0.08	5.55E+04	0.0000	0.0000	Thorium 232	4	3	1.98	4.05E+02	0.0049	0.0000
Uranium 234	17	16	20.01	4.05E+05	0.0000	0.0000	Uranium 234	6	6	33.05	5.13E+03	0.0064	0.0001
Uranium 235	15	14	1.94	4.25E+05	0.0000	0.0000	Uranium 235	6	6	2.50	2.67E+03	0.0009	0.0000
Uranium 238	17	16	17.81	4.12E+05	0.0000	0.0000	Uranium 238	6	6	31.81	1.58E+03	0.0201	0.0002
Sum-of-the-Fractions					0.0004		**Sum-of-the-Fractions**					0.9937	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0099

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-37. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of Background for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	40	40	*0.38*	6.94E+03	0.0001	0.0000	Radium 226	78	77	*1.86*	4.31E+01	0.0432	0.0004
Radium 228	40	13	0.38	7.42E+03	0.0001	0.0000	Radium 228	41	41	*1.78*	4.56E+01	0.0390	0.0004
Thorium 232	38	26	*0.04*	5.55E+04	0.0000	0.0000	Thorium 232	41	41	*1.50*	4.05E+02	0.0037	0.0000
Uranium 234	59	57	*0.75*	4.05E+05	0.0000	0.0000	Uranium 234	60	59	*1.26*	5.13E+03	0.0002	0.0000
Uranium 235	59	37	*0.05*	4.25E+05	0.0000	0.0000	Uranium 235	60	59	*0.11*	2.67E+03	0.0000	0.0000
Uranium 238	59	56	*0.60*	4.12E+05	0.0000	0.0000	Uranium 238	60	60	*1.33*	1.58E+03	0.0008	0.0000
Sum-of-the-Fractions					0.0001		**Sum-of-the-Fractions**					0.0870	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0009

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.0**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-38. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil for Northeast Area of PIA for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	1	1	13.40	6.94E+03	0.0019	0.0002	Radium 226	6	6	1.66	4.31E+01	0.0386	0.0039
Radium 228	1	1	1.43	7.42E+03	0.0002	0.0000	Radium 228	6	6	1.34	4.56E+01	0.0293	0.0029
Thorium 232	1	1	10.50	5.55E+04	0.0002	0.0000	Thorium 232	6	6	1.25	4.05E+02	0.0031	0.0003
Uranium 234	1	1	295.00	4.05E+05	0.0007	0.0001	Uranium 234	6	6	1.29	5.13E+03	0.0003	0.0000
Uranium 235	1	1	19.00	4.25E+05	0.0000	0.0000	Uranium 235	6	6	0.11	2.67E+03	0.0000	0.0000
Uranium 238	1	1	357.00	4.12E+05	0.0009	0.0001	Uranium 238	6	6	1.34	1.58E+03	0.0008	0.0001
Sum-of-the-Fractions					0.0040		**Sum-of-the-Fractions**					0.0721	
Total Ionizing Radiation in Water (rad/day)						0.0004	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0072

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.008**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-39. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil for Southwest area of PIA for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	0.91	6.94E+03	0.0001	0.0000	Radium 226	6	6	1.87	4.31E+01	0.0433	0.0043
Radium 228	16	13	1.16	7.42E+03	0.0002	0.0000	Radium 228	6	6	2.15	4.56E+01	0.0471	0.0047
Thorium 232	3	2	0.08	5.55E+04	0.0000	0.0000	Thorium 232	6	6	1.41	4.05E+02	0.0035	0.0003
Uranium 234	17	16	20.01	4.05E+05	0.0000	0.0000	Uranium 234	6	6	1.45	5.13E+03	0.0003	0.0000
Uranium 235	15	14	1.94	4.25E+05	0.0000	0.0000	Uranium 235	6	6	0.11	2.67E+03	0.0000	0.0000
Uranium 238	17	16	17.81	4.12E+05	0.0000	0.0000	Uranium 238	6	6	1.39	1.58E+03	0.0009	0.0001
Sum-of-the-Fractions					0.0004		**Sum-of-the-Fractions**					0.0951	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0095

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.01**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-40. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil of East Haul Road for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	39	39	*0.99*	6.94E+03	0.0001	0.0000	Radium 226	5	5	13.41	4.31E+01	0.3111	0.0311
Radium 228	36	19	0.74	7.42E+03	0.0001	0.0000	Radium 228	5	5	2.39	4.56E+01	0.0525	0.0053
Thorium 232	16	6	0.03	5.55E+04	0.0000	0.0000	Thorium 232	5	5	2.14	4.05E+02	0.0053	0.0005
Uranium 234	37	36	*20.70*	4.05E+05	0.0001	0.0000	Uranium 234	5	5	7.70	5.13E+03	0.0015	0.0002
Uranium 235	35	33	*0.83*	4.25E+05	0.0000	0.0000	Uranium 235	5	5	0.34	2.67E+03	0.0001	0.0000
Uranium 238	37	37	*18.00*	4.12E+05	0.0000	0.0000	Uranium 238	5	5	7.62	1.58E+03	0.0048	0.0005
Sum-of-the-Fractions					0.0003		**Sum-of-the-Fractions**					0.3754	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0375

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.04**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-41. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil of West Haul Road for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	0.91	6.94E+03	0.0001	0.0000	Radium 226	1	1	2.88	4.31E+01	0.0668	0.0067
Radium 228	16	13	1.16	7.42E+03	0.0002	0.0000	Radium 228	1	1	3.36	4.56E+01	0.0737	0.0074
Thorium 232	3	2	0.08	5.55E+04	0.0000	0.0000	Thorium 232	1	1	2.96	4.05E+02	0.0073	0.0007
Uranium 234	17	16	20.01	4.05E+05	0.0000	0.0000	Uranium 234	1	1	2.55	5.13E+03	0.0005	0.0000
Uranium 235	15	14	1.94	4.25E+05	0.0000	0.0000	Uranium 235	1	1	0.14	2.67E+03	0.0001	0.0000
Uranium 238	17	16	17.81	4.12E+05	0.0000	0.0000	Uranium 238	1	1	2.42	1.58E+03	0.0015	0.0002
Sum-of-the-Fractions					0.0004		**Sum-of-the-Fractions**					0.1499	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0150

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.02**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-42. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil of Background for Terrestrial Animals
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	40	40	*0.38*	6.94E+03	0.0001	0.0000	Radium 226	16	16	2.34	4.31E+01	0.0543	0.0054
Radium 228	40	13	0.38	7.42E+03	0.0001	0.0000	Radium 228	16	16	2.15	4.56E+01	0.0470	0.0047
Thorium 232	38	26	*0.04*	5.55E+04	0.0000	0.0000	Thorium 232	16	16	1.85	4.05E+02	0.0046	0.0005
Uranium 234	59	57	*0.75*	4.05E+05	0.0000	0.0000	Uranium 234	16	16	2.93	5.13E+03	0.0006	0.0001
Uranium 235	59	37	*0.05*	4.25E+05	0.0000	0.0000	Uranium 235	16	16	0.17	2.67E+03	0.0001	0.0000
Uranium 238	59	56	*0.60*	4.12E+05	0.0000	0.0000	Uranium 238	16	16	2.56	1.58E+03	0.0016	0.0002
Sum-of-the-Fractions					0.0001		**Sum-of-the-Fractions**					0.1082	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0108

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.01**

Result: Does not exceed the 0.1 rad/day for terrestrial animal.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-43. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of Mined Area for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	14	14	42.08	1.14E+07	0.0000	0.0000	Radium 226	119	114	*29.89*	2.46E+02	0.1215	0.1215
Radium 228	14	12	3.29	1.07E+07	0.0000	0.0000	Radium 228	27	24	*3.01*	2.61E+02	0.0115	0.0115
Thorium 232	4	3	23.55	1.07E+07	0.0000	0.0000	Thorium 232	27	15	2.76	4.44E+03	0.0006	0.0006
Uranium 234	14	14	5505.71	2.94E+09	0.0000	0.0000	Uranium 234	83	83	*19.20*	5.16E+04	0.0004	0.0004
Uranium 235	14	13	257.79	1.03E+08	0.0000	0.0000	Uranium 235	83	72	*0.82*	2.74E+04	0.0000	0.0000
Uranium 238	14	14	5704.29	4.28E+07	0.0001	0.0001	Uranium 238	83	83	*20.44*	1.58E+04	0.0013	0.0013
Sum-of-the-Fractions					0.0001		**Sum-of-the-Fractions**					0.1354	
Total Ionizing Radiation in Water (rad/day)						0.0001	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.1354

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.1**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Pit 3
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-44. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil for Northeast Area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Surface Soil**						
Radium 226	1	1	13.40	1.14E+07	0.0000	0.0000	Radium 226	27	27	*3.74*	2.46E+02	0.0152	0.0152
Radium 228	1	1	1.43	1.07E+07	0.0000	0.0000	Radium 228	16	16	1.24	2.61E+02	0.0047	0.0047
Thorium 232	1	1	10.50	1.07E+07	0.0000	0.0000	Thorium 232	16	16	1.07	4.44E+03	0.0002	0.0002
Uranium 234	1	1	295.00	2.94E+09	0.0000	0.0000	Uranium 234	21	21	*2.37*	5.16E+04	0.0000	0.0000
Uranium 235	1	1	19.00	1.03E+08	0.0000	0.0000	Uranium 235	21	20	*0.15*	2.74E+04	0.0000	0.0000
Uranium 238	1	1	357.00	4.28E+07	0.0000	0.0000	Uranium 238	21	21	*2.35*	1.58E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0204	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0204

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.02**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-45. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil for Southwest Area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	0.91	1.14E+07	0.0000	0.0000	Radium 226	18	18	3.29	2.46E+02	0.0134	0.0134
Radium 228	16	13	1.16	1.07E+07	0.0000	0.0000	Radium 228	16	16	1.83	2.61E+02	0.0070	0.0070
Thorium 232	3	2	0.08	1.07E+07	0.0000	0.0000	Thorium 232	16	16	1.40	4.44E+03	0.0003	0.0003
Uranium 234	17	16	20.01	2.94E+09	0.0000	0.0000	Uranium 234	16	16	2.11	5.16E+04	0.0000	0.0000
Uranium 235	15	14	1.94	1.03E+08	0.0000	0.0000	Uranium 235	16	15	0.12	2.74E+04	0.0000	0.0000
Uranium 238	17	16	17.81	4.28E+07	0.0000	0.0000	Uranium 238	16	16	2.05	1.58E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0209	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0209

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.02**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-46. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of East Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	39	39	*0.99*	1.14E+07	0.0000	0.0000	Radium 226	19	19	16.57	2.46E+02	0.0673	0.0673
Radium 228	36	19	0.74	1.07E+07	0.0000	0.0000	Radium 228	12	12	2.14	2.61E+02	0.0082	0.0082
Thorium 232	16	6	0.03	1.07E+07	0.0000	0.0000	Thorium 232	12	12	1.87	4.44E+03	0.0004	0.0004
Uranium 234	37	36	*20.70*	2.94E+09	0.0000	0.0000	Uranium 234	17	17	13.45	5.16E+04	0.0003	0.0003
Uranium 235	35	33	*0.83*	1.03E+08	0.0000	0.0000	Uranium 235	17	16	0.86	2.74E+04	0.0000	0.0000
Uranium 238	37	37	*18.00*	4.28E+07	0.0000	0.0000	Uranium 238	17	17	12.66	1.58E+04	0.0008	0.0008
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0771	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0771

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.1**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-47. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of West Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	18	18	0.91	1.14E+07	0.0000	0.0000	Radium 226	6	6	39.29	2.46E+02	0.1597	0.1597
Radium 228	16	13	1.16	1.07E+07	0.0000	0.0000	Radium 228	4	4	2.27	2.61E+02	0.0087	0.0087
Thorium 232	3	2	0.08	1.07E+07	0.0000	0.0000	Thorium 232	4	3	1.98	4.44E+03	0.0004	0.0004
Uranium 234	17	16	20.01	2.94E+09	0.0000	0.0000	Uranium 234	6	6	33.05	5.16E+04	0.0006	0.0006
Uranium 235	15	14	1.94	1.03E+08	0.0000	0.0000	Uranium 235	6	6	2.50	2.74E+04	0.0001	0.0001
Uranium 238	17	16	17.81	4.28E+07	0.0000	0.0000	Uranium 238	6	6	31.81	1.58E+04	0.0020	0.0020
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.1716	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.1716

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.2**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-48. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Surface Soil of Background for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Surface Soil**						
Radium 226	40	40	*0.38*	1.14E+07	0.0000	0.0000	Radium 226	78	77	*1.86*	2.46E+02	0.0076	0.0076
Radium 228	40	13	0.38	1.07E+07	0.0000	0.0000	Radium 228	41	41	*1.78*	2.61E+02	0.0068	0.0068
Thorium 232	38	26	*0.04*	1.07E+07	0.0000	0.0000	Thorium 232	41	41	*1.50*	4.44E+03	0.0003	0.0003
Uranium 234	59	57	*0.75*	2.94E+09	0.0000	0.0000	Uranium 234	60	59	*1.26*	5.16E+04	0.0000	0.0000
Uranium 235	59	37	*0.05*	1.03E+08	0.0000	0.0000	Uranium 235	60	59	*0.11*	2.74E+04	0.0000	0.0000
Uranium 238	59	56	*0.60*	4.28E+07	0.0000	0.0000	Uranium 238	60	60	*1.33*	1.58E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0148	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Surface Soil (rad/day)**						0.0148

Total Ionizing Radiation in Water plus Surface Soil (rad/day): **0.01**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-49. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil for Northeast Area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	1	1	13.40	1.14E+07	0.0000	0.0000	Radium 226	6	6	1.66	2.46E+02	0.0068	0.0068
Radium 228	1	1	1.43	1.07E+07	0.0000	0.0000	Radium 228	6	6	1.34	2.61E+02	0.0051	0.0051
Thorium 232	1	1	10.50	1.07E+07	0.0000	0.0000	Thorium 232	6	6	1.25	4.44E+03	0.0003	0.0003
Uranium 234	1	1	295.00	2.94E+09	0.0000	0.0000	Uranium 234	6	6	1.29	5.16E+04	0.0000	0.0000
Uranium 235	1	1	19.00	1.03E+08	0.0000	0.0000	Uranium 235	6	6	0.11	2.74E+04	0.0000	0.0000
Uranium 238	1	1	357.00	4.28E+07	0.0000	0.0000	Uranium 238	6	6	1.34	1.58E+04	0.0001	0.0001
Sum-of-the-Fractions					0.0000		**Sum-of-the-Fractions**					0.0123	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0123

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.012**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Northeastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-50. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil for Southwest area of PIA for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	0.91	6.94E+03	0.0001	0.0000	Radium 226	6	6	1.87	2.46E+02	0.0076	0.0008
Radium 228	16	13	1.16	7.42E+03	0.0002	0.0000	Radium 228	6	6	2.15	2.61E+02	0.0082	0.0008
Thorium 232	3	2	0.08	5.55E+04	0.0000	0.0000	Thorium 232	6	6	1.41	4.44E+03	0.0003	0.0000
Uranium 234	17	16	20.01	4.05E+05	0.0000	0.0000	Uranium 234	6	6	1.45	5.16E+04	0.0000	0.0000
Uranium 235	15	14	1.94	4.25E+05	0.0000	0.0000	Uranium 235	6	6	0.11	2.74E+04	0.0000	0.0000
Uranium 238	17	16	17.81	4.12E+05	0.0000	0.0000	Uranium 238	6	6	1.39	1.58E+04	0.0001	0.0000
Sum-of-the-Fractions					0.0004		**Sum-of-the-Fractions**					0.0163	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0016

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.002**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-51. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil of East Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/L)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**	**Radionuclide[1]**	**Number of Samples**	**Number of Detects**	**Central Tendency (pCi/g)[4]**	**Biota Concentration Guide (BCG)[2]**	**Partial Fraction**	**Rad/day**
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	39	39	*0.99*	6.94E+03	0.0001	0.0000	Radium 226	5	5	13.41	2.46E+02	0.0545	0.0055
Radium 228	36	19	0.74	7.42E+03	0.0001	0.0000	Radium 228	5	5	2.39	2.61E+02	0.0092	0.0009
Thorium 232	16	6	0.03	5.55E+04	0.0000	0.0000	Thorium 232	5	5	2.14	4.44E+03	0.0005	0.0000
Uranium 234	37	36	*20.70*	4.05E+05	0.0001	0.0000	Uranium 234	5	5	7.70	5.16E+04	0.0001	0.0000
Uranium 235	35	33	*0.83*	4.25E+05	0.0000	0.0000	Uranium 235	5	5	0.34	2.74E+04	0.0000	0.0000
Uranium 238	37	37	*18.00*	4.12E+05	0.0000	0.0000	Uranium 238	5	5	7.62	1.58E+04	0.0005	0.0000
Sum-of-the-Fractions					0.0003		**Sum-of-the-Fractions**					0.0648	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0065

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.01**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Upper Eastern Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-52. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil of West Haul Road for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	18	18	0.91	6.94E+03	0.0001	0.0000	Radium 226	1	1	2.88	2.46E+02	0.0117	0.0012
Radium 228	16	13	1.16	7.42E+03	0.0002	0.0000	Radium 228	1	1	3.36	2.61E+02	0.0129	0.0013
Thorium 232	3	2	0.08	5.55E+04	0.0000	0.0000	Thorium 232	1	1	2.96	4.44E+03	0.0007	0.0001
Uranium 234	17	16	20.01	4.05E+05	0.0000	0.0000	Uranium 234	1	1	2.55	5.16E+04	0.0000	0.0000
Uranium 235	15	14	1.94	4.25E+05	0.0000	0.0000	Uranium 235	1	1	0.14	2.74E+04	0.0000	0.0000
Uranium 238	17	16	17.81	4.12E+05	0.0000	0.0000	Uranium 238	1	1	2.42	1.58E+04	0.0002	0.0000
Sum-of-the-Fractions					0.0004		**Sum-of-the-Fractions**					0.0255	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0025

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.003**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Western Drainage
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Table S-53. Total Ionizing Radiation Based on Central Tendency[3] Concentrations of Surface Water and Subsurface Soil of Background for Terrestrial Plants
Midnite Mine Site
Wellpinit, WA

Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/L)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day	Radionuclide[1]	Number of Samples	Number of Detects	Central Tendency (pCi/g)[4]	Biota Concentration Guide (BCG)[2]	Partial Fraction	Rad/day
Surface Water[3]							**Sub-Surface Soil**						
Radium 226	40	40	*0.38*	6.94E+03	0.0001	0.0000	Radium 226	16	16	2.34	2.46E+02	0.0095	0.0010
Radium 228	40	13	0.38	7.42E+03	0.0001	0.0000	Radium 228	16	16	2.15	2.61E+02	0.0082	0.0008
Thorium 232	38	26	*0.04*	5.55E+04	0.0000	0.0000	Thorium 232	16	16	1.85	4.44E+03	0.0004	0.0000
Uranium 234	59	57	*0.75*	4.05E+05	0.0000	0.0000	Uranium 234	16	16	2.93	5.16E+04	0.0001	0.0000
Uranium 235	59	37	*0.05*	4.25E+05	0.0000	0.0000	Uranium 235	16	16	0.17	2.74E+04	0.0000	0.0000
Uranium 238	59	56	*0.60*	4.12E+05	0.0000	0.0000	Uranium 238	16	16	2.56	1.58E+04	0.0002	0.0000
Sum-of-the-Fractions					0.0001		**Sum-of-the-Fractions**					0.0184	
Total Ionizing Radiation in Water (rad/day)						0.0000	**Total Ionizing Radiation in Subsurface Soil (rad/day)**						0.0018

Total Ionizing Radiation in Water plus Subsurface Soil (rad/day): **0.002**

Result: Does not exceed the criteria of 1.0 rad/day for terrestrial plant.

1. Radionuclides listed based on available results from E&E (1998), SMI (1999), and URS (2000).
2. BCG values derived from U.S. DOE RESRAD-BIOTA Model, Version 1.0 (2003).
3. Water exposure derived from Background site
4. Central Tendency given as either mean or median values or not calculated depending on sample size and the number of non-detections. Italicized #'s = median values, Non-Italicized #'s = mean values, nc = not calculated. (See Appendix B)

pCi/L = picoCurie per liter
rad/day = rad per day
pCi/g = picoCurie per gram

Appendix T - Acute Hazard Quotients
For Food Chain Models
Midnite Mine Site
Wellpinit, Washington

Table T 1. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Mammals
AOI: Mined Area, Soils (Using Water Concentrations from Pit 3)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.18	0.02	0.01	0.00	0.75	0.08	0.30	0.03	0.25	0.02	0.06	0.00
Cadmium	0.02	0.00	0.00	0.00	0.52	0.05	0.28	0.03	0.22	0.02	0.12	0.01
Chromium	0.01	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.04	0.00	0.00	0.00
Cobalt	0.02	0.00	0.01	0.00	0.24	0.02	0.03	0.00	0.10	0.01	0.01	0.00
Copper	0.02	0.00	0.00	0.00	0.97	0.10	0.06	0.00	0.41	0.04	0.02	0.00
Lead	0.01	0.00	0.00	0.00	0.14	0.01	0.01	0.00	0.06	0.00	0.00	0.00
Manganese	0.27	0.03	0.06	0.00	1.80	0.18	0.93	0.09	0.72	0.07	0.34	0.03
Molybdenum	0.12	0.01	0.01	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.03	0.00	0.01	0.00	0.20	0.02	0.06	0.00	0.08	0.00	0.02	0.00
Selenium	2.64	0.26	0.05	0.00	3.21	0.32	2.69	0.26	0.30	0.03	0.08	0.00
Thallium	0.02	0.00	0.00	0.00	0.18	0.02	0.04	0.00	0.07	0.00	0.01	0.00
Uranium	2.15	0.21	0.59	0.06	52.8	5.28	2.40	0.24	22.5	2.25	0.70	0.07
Vanadium	0.45	0.04	0.04	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.02	0.00	0.00	0.00	0.21	0.02	0.07	0.00	0.08	0.00	0.03	0.00

	White-tailed Deer								Coyote							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.75	0.08	0.00	0.00	0.78	0.08	0.01	0.00	0.04	0.00	0.00	0.00	0.15	0.02	0.00	0.00
Cadmium	0.06	0.00	0.00	0.00	0.13	0.01	0.02	0.00	0.01	0.00	0.00	0.00	6.38	0.63	0.15	0.02
Chromium	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Cobalt	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Copper	0.08	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.02	0.02	0.00
Lead	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02	0.01	0.00
Manganese	0.86	0.09	0.02	0.00	1.02	0.10	0.07	0.00	0.07	0.00	0.03	0.00	0.16	0.02	0.03	0.00
Molybdenum	0.51	0.05	0.01	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	1.04	0.10	0.10	0.01
Nickel	0.07	0.00	0.00	0.00	0.08	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.01	0.00
Selenium	11.1	1.11	0.02	0.00	11.1	1.11	0.03	0.00	0.65	0.06	0.01	0.00	38.7	3.87	0.54	0.05
Thallium	0.10	0.01	0.00	0.00	0.11	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Uranium	5.86	0.58	0.20	0.02	5.93	0.59	0.22	0.02	0.56	0.06	0.28	0.03	6.37	0.63	0.58	0.05
Vanadium	1.90	0.19	0.02	0.00	N/A	N/A	N/A	N/A	0.11	0.01	0.01	0.00	0.18	0.02	0.01	0.00
Zinc	0.07	0.00	0.00	0.00	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.67	0.16	0.07	0.00

	Bobcat								Deer Mouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.06	0.00	0.00	0.00	0.20	0.02	0.00	0.00	2.69	0.26	0.03	0.00	2.88	0.29	0.09	0.00
Cadmium	0.01	0.00	0.00	0.00	8.40	0.84	0.16	0.02	0.18	0.02	0.00	0.00	0.61	0.06	0.14	0.01
Chromium	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.13	0.01	0.00	0.00	0.14	0.01	0.01	0.00
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.13	0.01	0.02	0.00	0.15	0.02	0.02	0.00
Copper	0.01	0.00	0.00	0.00	0.27	0.03	0.02	0.00	0.26	0.03	0.01	0.00	0.76	0.08	0.17	0.02
Lead	0.00	0.00	0.00	0.00	0.22	0.02	0.01	0.00	0.11	0.01	0.00	0.00	0.13	0.01	0.01	0.00
Manganese	0.08	0.00	0.03	0.00	0.20	0.02	0.03	0.00	2.29	0.23	0.09	0.00	3.13	0.31	0.35	0.04
Molybdenum	0.04	0.00	0.00	0.00	1.37	0.14	0.11	0.01	1.82	0.18	0.09	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.10	0.01	0.01	0.00	0.14	0.01	0.01	0.00	0.19	0.02	0.03	0.00
Selenium	0.84	0.08	0.01	0.00	50.9	5.09	0.57	0.05	39.2	3.92	0.28	0.03	39.5	3.95	0.39	0.04
Thallium	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.37	0.04	0.01	0.00	0.4	0.04	0.03	0.00
Uranium	0.64	0.06	0.29	0.02	8.28	0.82	0.61	0.06	12.5	1.25	0.71	0.07	13.1	1.31	0.91	0.09
Vanadium	0.14	0.01	0.01	0.00	0.24	0.02	0.01	0.00	6.82	0.68	0.23	0.02	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	2.20	0.22	0.08	0.00	0.19	0.02	0.01	0.00	0.41	0.04	0.07	0.00

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	2.91	0.29	0.06	0.00	51.9	5.19	1.15	0.01
Cadmium	0.20	0.02	0.01	0.00	617	61.70	14.2	1.42
Chromium	0.14	0.01	0.01	0.00	28.4	2.84	2.21	0.22
Cobalt	0.16	0.02	0.05	0.00	0.84	0.08	0.17	0.02
Copper	0.28	0.03	0.03	0.00	27.7	2.77	2.66	0.27
Lead	0.12	0.01	0.01	0.00	511	51.10	30.2	3.02
Manganese	2.62	0.26	0.29	0.03	12.0	1.20	0.75	0.07
Molybdenum	1.96	0.19	0.19	0.02	76.8	7.68	7.52	0.75
Nickel	0.17	0.02	0.03	0.00	17.6	1.76	2.00	0.20
Selenium	42.3	4.23	0.61	0.06	10588	1058.00	146	14.60
Thallium	0.40	0.04	0.02	0.00	7.60	0.76	0.35	0.03
Uranium	15.0	1.50	2.48	0.24	28.0	2.80	3.16	0.32
Vanadium	7.35	0.73	0.49	0.05	19.2	1.92	1.27	0.13
Zinc	0.22	0.02	0.02	0.00	179	17.90	7.60	0.76

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 2. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Birds
AOI: Mined Area, Soils (Using Water Concentrations from Pit 3)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.03	0.00	0.00	0.00	0.10	0.01	0.06	0.00
Cadmium	0.01	0.00	0.00	0.00	0.28	0.03	0.25	0.03
Chromium	0.04	0.00	0.00	0.00	0.35	0.04	0.29	0.03
Cobalt	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Copper	0.01	0.00	0.00	0.00	1.47	0.14	1.34	0.13
Lead	0.02	0.00	0.00	0.00	0.18	0.02	0.15	0.02
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Selenium	0.36	0.04	0.01	0.00	0.63	0.06	0.25	0.03
Thallium	0.01	0.00	0.00	0.00	0.06	0.00	0.05	0.00
Uranium	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.49	0.05	0.44	0.04

	Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.17	0.02	0.01	0.00	0.22	0.02	0.05	0.00
Cadmium	0.02	0.00	0.00	0.00	0.19	0.02	0.14	0.01
Chromium	0.21	0.02	0.04	0.00	0.25	0.03	0.07	0.00
Cobalt	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Copper	0.04	0.00	0.01	0.00	0.08	0.00	0.04	0.00
Lead	0.09	0.00	0.01	0.00	0.10	0.01	0.02	0.00
Manganese	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Molybdenum	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.02	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Selenium	1.82	0.18	0.06	0.00	1.83	0.18	0.08	0.00
Thallium	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.00	0.01	0.00	0.08	0.00	0.05	0.00

	American Robin							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.14	0.01	0.01	0.00	1.24	0.12	0.06	0.00
Cadmium	0.02	0.00	0.00	0.00	22.2	0.22	1.18	0.12
Chromium	0.17	0.02	0.03	0.00	17.3	0.17	3.08	0.31
Cobalt	0.01	0.00	0.01	0.00	0.03	0.00	0.01	0.00
Copper	0.03	0.00	0.01	0.00	1.59	0.16	0.35	0.04
Lead	0.07	0.00	0.01	0.00	145	14.50	19.7	1.97
Manganese	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Molybdenum	0.01	0.00	0.00	0.00	0.22	0.02	0.05	0.00
Nickel	0.01	0.00	0.00	0.00	0.50	0.05	0.13	0.01
Selenium	1.49	0.15	0.05	0.00	177	17.70	5.60	0.56
Thallium	0.03	0.00	0.00	0.00	0.26	0.03	0.03	0.00
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Zinc	0.03	0.00	0.00	0.00	9.60	0.96	0.94	0.09

	Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.31	0.03	0.00	0.00	0.36	0.04	0.00	0.00
Cadmium	0.03	0.00	0.00	0.00	4.98	0.49	0.12	0.01
Chromium	0.39	0.04	0.00	0.00	1.12	0.11	0.06	0.00
Cobalt	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.07	0.00	0.00	0.00	0.32	0.03	0.02	0.00
Lead	0.17	0.02	0.00	0.00	1.20	0.12	0.06	0.00
Manganese	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Molybdenum	0.03	0.00	0.00	0.00	0.09	0.00	0.01	0.00
Nickel	0.02	0.00	0.00	0.00	0.06	0.00	0.01	0.00
Selenium	3.35	0.33	0.01	0.00	17.0	1.70	0.20	0.02
Thallium	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Vanadium	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Zinc	0.05	0.00	0.00	0.00	1.98	0.20	0.08	0.00

	American Kestrel							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.33	0.03	0.00	0.00	0.39	0.04	0.01	0.00
Cadmium	0.04	0.00	0.00	0.00	5.33	0.53	0.36	0.04
Chromium	0.42	0.04	0.01	0.00	1.20	0.12	0.19	0.02
Cobalt	0.02	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Copper	0.08	0.00	0.00	0.00	0.34	0.03	0.08	0.00
Lead	0.18	0.02	0.00	0.00	1.28	0.13	0.20	0.02
Manganese	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Molybdenum	0.03	0.00	0.00	0.00	0.10	0.01	0.02	0.00
Nickel	0.02	0.00	0.00	0.00	0.07	0.00	0.02	0.00
Selenium	3.59	0.36	0.02	0.00	18.2	1.82	0.61	0.06
Thallium	0.07	0.00	0.00	0.00	0.09	0.00	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Vanadium	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Zinc	0.06	0.00	0.00	0.00	2.12	0.21	0.26	0.03

	Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.04	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	0.03	0.00	0.03	0.00
Chromium	0.06	0.00	0.01	0.00	0.06	0.00	0.02	0.00
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Lead	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Selenium	0.48	0.05	0.02	0.00	0.48	0.05	0.02	0.00
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.17	0.02	0.01	0.00	0.21	0.02	0.04	0.00
Cadmium	0.02	0.00	0.00	0.00	0.17	0.02	0.12	0.01
Chromium	0.21	0.02	0.04	0.00	0.28	0.03	0.10	0.01
Cobalt	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Copper	0.04	0.00	0.01	0.00	0.30	0.03	0.22	0.02
Lead	0.09	0.00	0.01	0.00	0.12	0.01	0.04	0.00
Manganese	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Molybdenum	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.02	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Selenium	1.82	0.18	0.06	0.00	1.87	0.19	0.10	0.01
Thallium	0.03	0.00	0.00	0.00	0.05	0.00	0.02	0.00
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.00	0.01	0.00	0.14	0.01	0.09	0.00

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 3. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Mammals
AOI: Mined Area, Soils (Using Water Concentrations from Pollution Control Pond)
Midnite Mine Site
Wellpinit, WA

Meadow Vole

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative AHQ	Model 2 Representative LOAEL HQ	Model 2 Representative AHQ	Model 3 - Roots Conservative LOAEL HQ	Model 3 - Roots Conservative AHQ	Model 3 - Veg. Conservative LOAEL HQ	Model 3 - Veg. Conservative AHQ	Model 4 - Roots Representative LOAEL HQ	Model 4 - Roots Representative AHQ	Model 4 - Veg. Representative LOAEL HQ	Model 4 - Veg. Representative AHQ
Arsenic	0.18	0.02	0.01	0.00	0.75	0.07	0.30	0.03	0.25	0.02	0.06	0.00
Cadmium	0.02	0.00	0.00	0.00	0.52	0.05	0.28	0.03	0.22	0.02	0.12	0.01
Chromium	0.01	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.04	0.00	0.00	0.00
Cobalt	0.03	0.00	0.01	0.00	0.24	0.02	0.03	0.00	0.10	0.01	0.01	0.00
Copper	0.02	0.00	0.00	0.00	0.97	0.10	0.06	0.00	0.41	0.04	0.02	0.00
Lead	0.01	0.00	0.00	0.00	0.14	0.01	0.01	0.00	0.06	0.00	0.00	0.00
Manganese	0.30	0.03	0.06	0.00	1.83	0.18	0.96	0.10	0.72	0.07	0.34	0.03
Molybdenum	0.12	0.01	0.01	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.03	0.00	0.01	0.00	0.21	0.02	0.06	0.00	0.08	0.00	0.02	0.00
Selenium	2.64	0.26	0.05	0.00	3.22	0.32	2.70	0.27	0.30	0.03	0.08	0.00
Thallium	0.02	0.00	0.00	0.00	0.18	0.02	0.04	0.00	0.07	0.00	0.01	0.00
Uranium	2.51	0.25	0.60	0.06	53.1	5.31	2.77	0.27	22.5	2.25	0.71	0.07
Vanadium	0.45	0.05	0.04	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.02	0.00	0.00	0.00	0.21	0.02	0.07	0.00	0.08	0.00	0.03	0.00

White-tailed Deer

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative AHQ	Model 2 Representative LOAEL HQ	Model 2 Representative AHQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative AHQ	Model 4 Representative LOAEL HQ	Model 4 Representative AHQ
Arsenic	0.75	0.07	0.00	0.00	0.78	0.08	0.01	0.00
Cadmium	0.06	0.00	0.00	0.00	0.13	0.01	0.02	0.00
Chromium	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Cobalt	0.07	0.00	0.00	0.00	0.07	0.01	0.00	0.00
Copper	0.08	0.00	0.00	0.00	0.09	0.01	0.00	0.00
Lead	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Manganese	0.91	0.09	0.02	0.00	1.07	0.11	0.07	0.01
Molybdenum	0.51	0.05	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.07	0.00	0.00	0.00	0.08	0.01	0.01	0.00
Selenium	11.1	1.11	0.02	0.00	11.1	0.01	0.03	0.00
Thallium	0.10	0.01	0.00	0.00	0.11	0.01	0.00	0.00
Uranium	6.60	0.66	0.21	0.02	6.66	0.67	0.23	0.02
Vanadium	1.90	0.19	0.02	0.00	N/A	N/A	N/A	N/A
Zinc	0.07	0.00	0.00	0.00	0.08	0.01	0.01	0.00

Coyote

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative AHQ	Model 2 Representative LOAEL HQ	Model 2 Representative AHQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative AHQ	Model 4 Representative LOAEL HQ	Model 4 Representative AHQ
Arsenic	0.04	0.00	0.00	0.00	0.15	0.02	0.00	0.00
Cadmium	0.01	0.00	0.00	0.00	6.38	0.06	0.15	0.02
Chromium	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.20	0.02	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.17	0.02	0.01	0.00
Manganese	0.08	0.01	0.03	0.00	0.17	0.02	0.03	0.00
Molybdenum	0.03	0.00	0.00	0.00	1.04	0.10	0.10	0.01
Nickel	0.01	0.00	0.00	0.00	0.08	0.01	0.01	0.00
Selenium	0.65	0.07	0.01	0.00	38.7	3.87	0.54	0.05
Thallium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Uranium	0.66	0.07	0.28	0.03	6.47	0.65	0.59	0.06
Vanadium	0.11	0.01	0.01	0.00	0.18	0.02	0.01	0.00
Zinc	0.01	0.00	0.00	0.00	1.67	0.17	0.07	0.01

Bobcat

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative AHQ	Model 2 Representative LOAEL HQ	Model 2 Representative AHQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative AHQ	Model 4 Representative LOAEL HQ	Model 4 Representative AHQ
Arsenic	0.06	0.01	0.00	0.00	0.20	0.02	0.00	0.00
Cadmium	0.01	0.00	0.00	0.00	8.40	0.84	0.16	0.02
Chromium	0.00	0.00	0.00	0.00	0.08	0.01	0.00	0.00
Cobalt	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Copper	0.01	0.00	0.00	0.00	0.27	0.03	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.22	0.02	0.01	0.00
Manganese	0.09	0.01	0.03	0.00	0.21	0.02	0.03	0.00
Molybdenum	0.04	0.00	0.00	0.00	1.37	0.14	0.11	0.01
Nickel	0.01	0.00	0.00	0.00	0.10	0.01	0.01	0.00
Selenium	0.85	0.09	0.01	0.00	50.92	5.09	0.57	0.06
Thallium	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Uranium	0.74	0.07	0.29	0.03	8.38	0.84	0.62	0.06
Vanadium	0.14	0.01	0.01	0.00	0.24	0.02	0.01	0.00
Zinc	0.01	0.00	0.00	0.00	2.20	0.22	0.08	0.01

Deer Mouse

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative AHQ	Model 2 Representative LOAEL HQ	Model 2 Representative AHQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative AHQ	Model 4 Representative LOAEL HQ	Model 4 Representative AHQ
Arsenic	2.69	0.27	0.03	0.00	2.88	0.29	0.09	0.01
Cadmium	0.18	0.02	0.00	0.00	0.61	0.06	0.14	0.01
Chromium	0.13	0.01	0.00	0.00	0.14	0.01	0.01	0.00
Cobalt	0.14	0.01	0.02	0.00	0.16	0.02	0.02	0.00
Copper	0.26	0.03	0.01	0.00	0.77	0.08	0.17	0.02
Lead	0.11	0.01	0.00	0.00	0.13	0.01	0.01	0.00
Manganese	2.32	0.23	0.09	0.01	3.16	0.31	0.35	0.04
Molybdenum	1.82	0.18	0.09	0.01	N/A	N/A	N/A	N/A
Nickel	0.14	0.01	0.01	0.00	0.19	0.02	0.03	0.00
Selenium	39.2	3.92	0.28	0.03	39.5	3.95	0.38	0.04
Thallium	0.37	0.04	0.01	0.00	0.42	0.04	0.03	0.00
Uranium	13.0	1.30	0.72	0.07	13.6	1.36	0.92	0.09
Vanadium	6.82	0.68	0.23	0.02	N/A	N/A	N/A	N/A
Zinc	0.20	0.02	0.01	0.00	0.41	0.04	0.07	0.01

Masked Shrew

Analyte	Model 1 Conservative LOAEL HQ	Model 1 Conservative AHQ	Model 2 Representative LOAEL HQ	Model 2 Representative AHQ	Model 3 Conservative LOAEL HQ	Model 3 Conservative AHQ	Model 4 Representative LOAEL HQ	Model 4 Representative AHQ
Arsenic	2.91	0.29	0.06	0.01	51.9	5.19	1.15	0.11
Cadmium	0.20	0.02	0.01	0.00	617	61.70	14.2	1.42
Chromium	0.14	0.01	0.01	0.00	28.4	2.84	2.21	0.22
Cobalt	0.17	0.02	0.05	0.01	0.85	0.09	0.18	0.02
Copper	0.28	0.03	0.03	0.00	27.7	2.77	2.66	0.27
Lead	0.12	0.01	0.01	0.00	511	51.10	30.2	3.02
Manganese	2.68	0.27	0.29	0.03	12.1	1.21	0.75	0.08
Molybdenum	1.96	0.20	0.19	0.02	76.8	7.68	7.52	0.75
Nickel	0.17	0.02	0.04	0.00	17.6	1.76	2.00	0.20
Selenium	42.3	4.23	0.60	0.06	10588	1058.00	146	14.60
Thallium	0.40	0.04	0.02	0.00	7.60	0.76	0.35	0.04
Uranium	16.0	1.60	2.53	0.25	28.9	2.89	3.21	0.32
Vanadium	7.35	0.73	0.49	0.05	19.2	1.92	1.27	0.13
Zinc	0.22	0.02	0.02	0.00	179	17.90	7.60	0.76

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
(green) HQ < 1.0
(yellow) HQ>1 for Chronic LOAEL Calculations
(red) HQ ≥ 1.0 for AHQ Calculations

Table T 4. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Birds
AOI: Mined Area, Soils (Using Water Concentrations from Pollution Control Pond)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.03	0.00	0.00	0.00	0.10	0.01	0.06	0.01
Cadmium	0.01	0.00	0.00	0.00	0.28	0.03	0.25	0.02
Chromium	0.04	0.00	0.00	0.00	0.35	0.03	0.29	0.03
Cobalt	0.01	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Copper	0.01	0.00	0.00	0.00	1.47	0.15	1.34	0.13
Lead	0.02	0.00	0.00	0.00	0.18	0.02	0.15	0.02
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Selenium	0.37	0.04	0.01	0.00	0.63	0.06	0.25	0.02
Thallium	0.01	0.00	0.00	0.00	0.06	0.01	0.05	0.01
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.49	0.0	0.44	0.04

	Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.17	0.02	0.01	0.00	0.22	0.02	0.05	0.00
Cadmium	0.02	0.00	0.00	0.00	0.19	0.02	0.14	0.01
Chromium	0.21	0.02	0.04	0.00	0.25	0.03	0.07	0.01
Cobalt	0.02	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Copper	0.04	0.00	0.01	0.00	0.08	0.01	0.04	0.00
Lead	0.09	0.01	0.01	0.00	0.10	0.01	0.02	0.00
Manganese	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Molybdenum	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.02	0.00	0.01	0.00	0.04	0.00	0.02	0.00
Selenium	1.82	0.18	0.06	0.01	1.84	0.18	0.07	0.01
Thallium	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.00	0.01	0.00	0.08	0.01	0.05	0.00

	American Robin							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.14	0.01	0.01	0.00	1.24	0.12	0.06	0.01
Cadmium	0.02	0.00	0.00	0.00	22.2	2.22	1.18	0.12
Chromium	0.17	0.02	0.03	0.00	17.3	1.73	3.08	0.3
Cobalt	0.01	0.00	0.01	0.00	0.03	0.00	0.01	0.00
Copper	0.03	0.00	0.01	0.00	1.59	0.16	0.35	0.04
Lead	0.07	0.01	0.01	0.00	145	14.50	19.7	2
Manganese	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Molybdenum	0.01	0.00	0.00	0.00	0.22	0.02	0.05	0.01
Nickel	0.01	0.00	0.00	0.00	0.51	0.05	0.13	0.01
Selenium	1.49	0.15	0.05	0.00	177	17.67	5.60	0.6
Thallium	0.03	0.00	0.00	0.00	0.26	0.03	0.03	0.00
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Zinc	0.03	0.00	0.00	0.00	9.60	0.96	0.94	0.1

	Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.31	0.03	0.00	0.00	0.36	0.04	0.00	0.00
Cadmium	0.03	0.00	0.00	0.00	4.98	0.5	0.12	0.01
Chromium	0.39	0.04	0.00	0.00	1.12	0.11	0.06	0.01
Cobalt	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.08	0.01	0.00	0.00	0.32	0.03	0.02	0.00
Lead	0.17	0.02	0.00	0.00	1.20	0.1	0.06	0.01
Manganese	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Molybdenum	0.03	0.00	0.00	0.00	0.09	0.01	0.01	0.00
Nickel	0.02	0.00	0.00	0.00	0.06	0.01	0.01	0.00
Selenium	3.35	0.34	0.01	0.00	17.0	1.7	0.20	0.02
Thallium	0.06	0.01	0.00	0.00	0.08	0.01	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Vanadium	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Zinc	0.05	0.01	0.00	0.00	1.98	0.2	0.08	0.01

	American Kestrel							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.33	0.03	0.00	0.00	0.39	0.04	0.01	0.00
Cadmium	0.04	0.00	0.00	0.00	5.33	0.53	0.36	0.04
Chromium	0.42	0.04	0.01	0.00	1.20	0.12	0.19	0.02
Cobalt	0.02	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Copper	0.08	0.01	0.00	0.00	0.34	0.03	0.08	0.01
Lead	0.18	0.02	0.00	0.00	1.28	0.13	0.20	0.02
Manganese	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Molybdenum	0.03	0.00	0.00	0.00	0.10	0.01	0.02	0.00
Nickel	0.02	0.00	0.00	0.00	0.07	0.01	0.02	0.00
Selenium	3.59	0.36	0.02	0.00	18.2	1.82	0.61	0.06
Thallium	0.07	0.01	0.00	0.00	0.09	0.01	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Vanadium	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Zinc	0.06	0.01	0.00	0.00	2.12	0.21	0.26	0.03

	Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.04	0.00	0.00	0.00	0.05	0.01	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	0.03	0.00	0.03	0.00
Chromium	0.06	0.01	0.01	0.00	0.06	0.01	0.02	0.00
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Lead	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01
Selenium	0.48	0.05	0.02	0.00	0.48	0.05	0.02	0.05
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.03
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.17	0.02	0.01	0.00	0.21	0.02	0.04	0.00
Cadmium	0.02	0.00	0.00	0.00	0.17	0.02	0.12	0.01
Chromium	0.21	0.02	0.04	0.00	0.28	0.03	0.10	0.01
Cobalt	0.02	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Copper	0.04	0.00	0.01	0.00	0.30	0.03	0.22	0.02
Lead	0.09	0.01	0.01	0.00	0.12	0.01	0.04	0.00
Manganese	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Molybdenum	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.02	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Selenium	1.82	0.18	0.06	0.01	1.87	0.19	0.10	0.01
Thallium	0.03	0.00	0.00	0.00	0.05	0.00	0.02	0.00
Uranium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.00	0.01	0.00	0.14	0.01	0.09	0.01

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
$HQ < 1.0$
$HQ>1$ for Chronic LOAEL Calculations
$HQ \geq 1.0$ for AHQ Calculations

Table T 5. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Mammals
AOI: Northeast PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.04	0.00	0.00	0.00	0.61	0.06	0.16	0.02	0.25	0.02	0.05	0.00
Cadmium	0.00	0.00	0.00	0.00	0.51	0.05	0.27	0.03	0.22	0.02	0.11	0.01
Chromium	0.00	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.04	0.00	0.00	0.00
Cobalt	0.01	0.00	0.00	0.00	0.22	0.02	0.01	0.00	0.10	0.01	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.95	0.04	0.05	0.00	0.41	0.04	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.14	0.01	0.00	0.00	0.06	0.00	0.00	0.00
Manganese	0.07	0.00	0.01	0.00	1.60	0.16	0.73	0.07	0.67	0.07	0.29	0.03
Molybdenum	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.18	0.02	0.04	0.00	0.08	0.00	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.58	0.06	0.06	0.00	0.25	0.03	0.03	0.00
Thallium	0.00	0.00	0.00	0.00	0.16	0.02	0.02	0.00	0.07	0.00	0.01	0.00
Uranium	0.03	0.00	0.01	0.00	50.65	5.07	0.28	0.03	21.93	2.13	0.12	0.01
Vanadium	0.17	0.02	0.04	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.19	0.01	0.06	0.00	0.08	0.00	0.02	0.00

	White-tailed Deer								Coyote							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.16	0.02	0.00	0.00	0.19	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Cadmium	0.01	0.00	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.00	0.00	0.00	1.46	0.15	0.19	0.02
Chromium	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Cobalt	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.01	0.00
Lead	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Manganese	0.26	0.03	0.00	0.00	0.42	0.04	0.05	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Molybdenum	0.03	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Nickel	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Selenium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.11	0.01	0.00	0.00	0.17	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.19	0.02	0.03	0.00
Vanadium	0.72	0.07	0.02	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.01	0.00	0.07	0.00	0.01	0.00
Zinc	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.05	0.07	0.00

	Bobcat								Deer Mouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.57	0.06	0.01	0.00	0.76	0.08	0.06	0.00
Cadmium	0.00	0.00	0.00	0.00	1.92	0.13	0.21	0.02	0.04	0.00	0.00	0.00	0.47	0.05	0.13	0.01
Chromium	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.01	0.00	0.07	0.00	0.01	0.00
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.11	0.01	0.02	0.00
Copper	0.00	0.00	0.00	0.00	0.10	0.01	0.01	0.00	0.10	0.01	0.01	0.00	0.61	0.06	0.16	0.02
Lead	0.00	0.00	0.00	0.00	0.07	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Manganese	0.02	0.00	0.00	0.00	0.07	0.00	0.01	0.00	0.83	0.08	0.05	0.00	1.67	0.17	0.31	0.03
Molybdenum	0.00	0.00	0.00	0.00	0.07	0.00	0.01	0.00	0.09	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.06	0.00	0.01	0.00	0.11	0.01	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.04	0.00	0.01	0.00	0.39	0.04	0.11	0.01
Thallium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.08	0.00	0.02	0.00
Uranium	0.01	0.00	0.00	0.00	0.25	0.02	0.03	0.00	0.34	0.03	0.03	0.00	0.98	0.04	0.22	0.02
Vanadium	0.05	0.00	0.01	0.00	0.09	0.00	0.01	0.00	2.57	0.26	0.25	0.02	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.67	0.07	0.07	0.00	0.06	0.00	0.00	0.00	0.27	0.03	0.07	0.00

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.61	0.06	0.01	0.00	10.96	1.10	0.26	0.03
Cadmium	0.04	0.00	0.01	0.00	141	14.10	18.6	1.86
Chromium	0.06	0.00	0.01	0.00	12.54	1.25	2.23	0.22
Cobalt	0.09	0.00	0.02	0.00	0.63	0.06	0.14	0.01
Copper	0.11	0.01	0.02	0.00	10.8	1.08	1.82	0.18
Lead	0.04	0.00	0.01	0.00	165	16.50	28.7	2.87
Manganese	0.92	0.09	0.11	0.01	4.53	0.45	0.58	0.06
Molybdenum	0.10	0.01	0.01	0.00	3.85	0.38	0.55	0.06
Nickel	0.07	0.00	0.01	0.00	8.64	0.86	1.64	0.16
Selenium	0.04	0.00	0.01	0.00	10.0	1.00	3.11	0.31
Thallium	0.03	0.00	0.01	0.00	0.61	0.06	0.14	0.01
Uranium	0.38	0.04	0.06	0.00	0.79	0.08	0.11	0.01
Vanadium	2.77	0.3	0.53	0.05	7.20	0.72	1.39	0.13
Zinc	0.06	0.00	0.01	0.00	54.5	5.45	7.46	0.74

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 6. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Birds
AOI: Northeast PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

Cliff Swallow

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.07	0.01	0.06	0.01
Cadmium	0.00	0.00	0.00	0.00	0.27	0.03	0.25	0.02
Chromium	0.02	0.00	0.00	0.00	0.33	0.03	0.29	0.03
Cobalt	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Copper	0.00	0.00	0.00	0.00	1.46	0.15	1.34	0.13
Lead	0.01	0.00	0.00	0.00	0.17	0.02	0.15	0.02
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.26	0.03	0.24	0.02
Thallium	0.00	0.00	0.00	0.00	0.06	0.01	0.05	0.01
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.48	0.0	0.44	0.04

Song Sparrow (Herbivore)

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.04	0.00	0.00	0.00	0.08	0.01	0.04	0.00
Cadmium	0.00	0.00	0.00	0.00	0.17	0.02	0.14	0.01
Chromium	0.09	0.01	0.04	0.00	0.13	0.01	0.07	0.01
Cobalt	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.02	0.00	0.01	0.00	0.06	0.01	0.04	0.00
Lead	0.03	0.00	0.01	0.00	0.04	0.00	0.02	0.00
Manganese	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Thallium	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.06	0.01	0.04	0.00

American Robin

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.03	0.00	0.00	0.00	0.26	0.03	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	5.07	0.51	1.54	0.15
Chromium	0.08	0.01	0.03	0.00	7.61	0.76	3.12	0.31
Cobalt	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Copper	0.01	0.00	0.00	0.00	0.62	0.06	0.24	0.02
Lead	0.02	0.00	0.01	0.00	46.8	4.68	18.7	1.87
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Nickel	0.00	0.00	0.00	0.00	0.25	0.02	0.11	0.01
Selenium	0.00	0.00	0.00	0.00	0.17	0.02	0.12	0.01
Thallium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.01	0.00	0.00	0.00	2.92	0.29	0.92	0.09

Great Horned Owl

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.07	0.01	0.00	0.00	0.08	0.01	0.00	0.00
Cadmium	0.01	0.00	0.00	0.00	1.14	0.11	0.15	0.02
Chromium	0.17	0.02	0.00	0.00	0.49	0.05	0.06	0.01
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.03	0.00	0.00	0.00	0.12	0.01	0.02	0.00
Lead	0.05	0.01	0.00	0.00	0.39	0.04	0.06	0.01
Manganese	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.02	0.00	0.00	0.00	0.60	0.06	0.08	0.01

American Kestrel

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.07	0.01	0.00	0.00	0.08	0.01	0.00	0.00
Cadmium	0.01	0.00	0.00	0.00	1.22	0.12	0.47	0.05
Chromium	0.19	0.02	0.01	0.00	0.53	0.05	0.19	0.02
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.03	0.00	0.00	0.00	0.13	0.01	0.05	0.01
Lead	0.06	0.01	0.00	0.00	0.41	0.04	0.19	0.02
Manganese	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.02	0.00	0.00	0.00	0.65	0.06	0.25	0.03

Spruce Grouse

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00
Chromium	0.02	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Lead	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Thallium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00

Song Sparrow (Omnivore)

Analyte	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.04	0.00	0.00	0.00	0.07	0.01	0.03	0.00
Cadmium	0.00	0.00	0.00	0.00	0.15	0.01	0.12	0.01
Chromium	0.09	0.01	0.04	0.00	0.17	0.02	0.10	0.01
Cobalt	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Copper	0.02	0.00	0.01	0.00	0.27	0.03	0.21	0.02
Lead	0.03	0.00	0.01	0.00	0.06	0.01	0.04	0.00
Manganese	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.05	0.01	0.04	0.00
Thallium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.11	0.01	0.09	0.01

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 7. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Mammals
AOI: Southwest PIA, Soils (Using Water Concentrations from Central Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.57	0.06	0.12	0.01	0.25	0.02	0.05	0.01
Cadmium	0.01	0.00	0.00	0.00	0.51	0.05	0.27	0.03	0.22	0.02	0.12	0.01
Chromium	0.00	0.00	0.00	0.00	0.08	0.01	0.01	0.00	0.04	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.22	0.02	0.01	0.00	0.10	0.01	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.95	0.10	0.04	0.00	0.41	0.04	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.14	0.01	0.00	0.00	0.06	0.01	0.00	0.00
Manganese	0.12	0.01	0.05	0.00	1.65	0.17	0.78	0.08	0.71	0.07	0.33	0.03
Molybdenum	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.19	0.02	0.05	0.00	0.08	0.01	0.02	0.00
Selenium	0.02	0.00	0.00	0.00	0.60	0.06	0.08	0.01	0.25	0.03	0.03	0.00
Thallium	0.00	0.00	0.00	0.00	0.16	0.02	0.02	0.00	0.07	0.01	0.01	0.00
Uranium	0.07	0.01	0.01	0.00	50.7	5.07	0.32	0.03	21.9	2.19	0.12	0.01
Vanadium	0.09	0.01	0.03	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.19	0.02	0.06	0.01	0.08	0.01	0.02	0.00

	White-tailed Deer								Coyote							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.02	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium	0.02	0.00	0.00	0.00	0.08	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.66	0.07	0.11	0.01
Chromium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Lead	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Manganese	0.28	0.03	0.02	0.00	0.44	0.04	0.07	0.01	0.03	0.00	0.02	0.00	0.04	0.00	0.02	0.00
Molybdenum	0.03	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.06	0.01	0.01	0.00
Nickel	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Selenium	0.09	0.01	0.00	0.00	0.11	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.33	0.03	0.03	0.00
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.18	0.02	0.01	0.00	0.24	0.02	0.02	0.00	0.02	0.00	0.01	0.00	0.20	0.02	0.03	0.00
Vanadium	0.40	0.04	0.01	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.01	0.00	0.04	0.00	0.01	0.00
Zinc	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.03	0.06	0.01

	Bobcat								Deer Mouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.01	0.00	0.25	0.02	0.06	0.01
Cadmium	0.00	0.00	0.00	0.00	0.87	0.09	0.12	0.01	0.03	0.00	0.00	0.00	0.46	0.05	0.14	0.01
Chromium	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.07	0.01	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.05	0.00	0.01	0.00	0.55	0.06	0.16	0.02
Lead	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Manganese	0.03	0.00	0.02	0.00	0.05	0.00	0.03	0.00	0.40	0.04	0.07	0.01	1.23	0.12	0.32	0.03
Molybdenum	0.00	0.00	0.00	0.00	0.08	0.01	0.01	0.00	0.10	0.01	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.05	0.00	0.01	0.00	0.10	0.01	0.02	0.00
Selenium	0.01	0.00	0.00	0.00	0.43	0.04	0.03	0.00	0.33	0.03	0.01	0.00	0.68	0.07	0.12	0.01
Thallium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.08	0.01	0.02	0.00
Uranium	0.02	0.00	0.01	0.00	0.27	0.03	0.03	0.00	0.40	0.04	0.03	0.00	1.04	0.1	0.23	0.02
Vanadium	0.03	0.00	0.01	0.00	0.05	0.01	0.01	0.00	1.44	0.1	0.18	0.02	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.34	0.03	0.06	0.01	0.03	0.00	0.00	0.00	0.25	0.03	0.07	0.01

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.07	0.01	0.01	0.00	1.19	0.12	0.26	0.03
Cadmium	0.04	0.00	0.01	0.00	63.5	6.35	10.4	1.04
Chromium	0.03	0.00	0.01	0.00	5.99	0.60	1.32	0.13
Cobalt	0.05	0.01	0.01	0.00	0.34	0.03	0.08	0.01
Copper	0.05	0.01	0.01	0.00	5.15	0.51	1.30	0.13
Lead	0.02	0.00	0.01	0.00	98.0	9.80	25.4	2.54
Manganese	0.54	0.05	0.22	0.02	1.67	0.17	0.52	0.05
Molybdenum	0.11	0.01	0.02	0.00	4.34	0.43	0.66	0.07
Nickel	0.06	0.01	0.02	0.00	4.92	0.49	1.11	0.11
Selenium	0.36	0.04	0.03	0.00	89.4	8.94	7.01	0.70
Thallium	0.03	0.00	0.01	0.00	0.52	0.05	0.12	0.01
Uranium	0.48	0.05	0.08	0.01	0.89	0.09	0.14	0.01
Vanadium	1.55	0.16	0.38	0.04	4.05	0.40	0.99	0.10
Zinc	0.04	0.00	0.01	0.00	27.3	2.73	6.15	0.62

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 8. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Birds
AOI: Southwest PIA, Soils (Using Water Concentrations from Central Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.07	0.01	0.06	0.01
Cadmium	0.00	0.00	0.00	0.00	0.27	0.03	0.25	0.02
Chromium	0.01	0.00	0.00	0.00	0.32	0.03	0.29	0.03
Cobalt	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Copper	0.00	0.00	0.00	0.00	1.46	0.15	1.34	0.13
Lead	0.00	0.00	0.00	0.00	0.17	0.02	0.15	0.02
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.27	0.03	0.24	0.02
Thallium	0.00	0.00	0.00	0.00	0.06	0.01	0.05	0.01
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.48	0.0	0.44	0.04

	Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.05	0.01	0.04	0.00
Cadmium	0.01	0.00	0.00	0.00	0.18	0.02	0.14	0.01
Chromium	0.04	0.00	0.02	0.00	0.08	0.01	0.06	0.01
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.05	0.00	0.04	0.00
Lead	0.02	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Manganese	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.02	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Thallium	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.06	0.01	0.04	0.00

	American Robin							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	2.28	0.23	0.86	0.09
Chromium	0.04	0.00	0.02	0.00	3.64	0.36	1.85	0.18
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Copper	0.01	0.00	0.00	0.00	0.30	0.03	0.17	0.02
Lead	0.01	0.00	0.01	0.00	27.8	2.78	16.5	1.65
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Nickel	0.00	0.00	0.00	0.00	0.14	0.01	0.07	0.01
Selenium	0.01	0.00	0.00	0.00	1.49	0.15	0.27	0.03
Thallium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.01	0.00	0.00	0.00	1.46	0.15	0.76	0.08

	Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	0.51	0.05	0.09	0.01
Chromium	0.08	0.01	0.00	0.00	0.24	0.02	0.04	0.00
Cobalt	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.06	0.01	0.01	0.00
Lead	0.03	0.00	0.00	0.00	0.23	0.02	0.05	0.01
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Selenium	0.03	0.00	0.00	0.00	0.14	0.01	0.01	0.00
Thallium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.01	0.00	0.00	0.00	0.30	0.03	0.07	0.01

	American Kestrel							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cadmium	0.01	0.00	0.00	0.00	0.55	0.06	0.26	0.03
Chromium	0.09	0.01	0.01	0.00	0.25	0.03	0.11	0.01
Cobalt	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.02	0.00	0.00	0.00	0.06	0.01	0.04	0.00
Lead	0.03	0.00	0.00	0.00	0.25	0.02	0.16	0.02
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Selenium	0.03	0.00	0.00	0.00	0.15	0.02	0.03	0.00
Thallium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.01	0.00	0.00	0.00	0.32	0.03	0.21	0.02

	Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00
Chromium	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Lead	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Thallium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.04	0.00	0.03	0.00
Cadmium	0.01	0.00	0.00	0.00	0.15	0.01	0.12	0.01
Chromium	0.04	0.00	0.02	0.00	0.12	0.01	0.08	0.01
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Copper	0.01	0.00	0.00	0.00	0.26	0.03	0.21	0.02
Lead	0.02	0.00	0.01	0.00	0.05	0.00	0.04	0.00
Manganese	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.02	0.00	0.00	0.00	0.07	0.01	0.05	0.00
Thallium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.11	0.01	0.09	0.01

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 9. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Mammals
AOI: East Haul Road PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.07	0.01	0.00	0.00	0.64	0.06	0.19	0.02	0.25	0.03	0.06	0.01
Cadmium	0.00	0.00	0.00	0.00	0.51	0.05	0.27	0.03	0.22	0.02	0.11	0.01
Chromium	0.00	0.00	0.00	0.00	0.08	0.01	0.01	0.00	0.04	0.00	0.00	0.00
Cobalt	0.01	0.00	0.00	0.00	0.22	0.02	0.01	0.00	0.10	0.01	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.96	0.10	0.05	0.01	0.41	0.04	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.14	0.01	0.00	0.00	0.06	0.01	0.00	0.00
Manganese	0.05	0.00	0.01	0.00	1.58	0.16	0.71	0.07	0.67	0.07	0.29	0.03
Molybdenum	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.19	0.02	0.04	0.00	0.08	0.01	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.58	0.06	0.06	0.01	0.25	0.03	0.03	0.00
Thallium	0.00	0.00	0.00	0.00	0.16	0.02	0.02	0.00	0.07	0.01	0.01	0.00
Uranium	0.13	0.01	0.02	0.00	50.8	5.08	0.39	0.04	21.9	2.19	0.13	0.01
Vanadium	0.14	0.01	0.03	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.19	0.02	0.05	0.01	0.08	0.01	0.02	0.00

	White-tailed Deer							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.29	0.03	0.00	0.00	0.32	0.03	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	0.08	0.01	0.02	0.00
Chromium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cobalt	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Copper	0.05	0.01	0.00	0.00	0.06	0.01	0.00	0.00
Lead	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Manganese	0.17	0.02	0.00	0.00	0.33	0.03	0.05	0.01
Molybdenum	0.08	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Selenium	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Thallium	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Uranium	0.55	0.06	0.01	0.00	0.61	0.06	0.03	0.00
Vanadium	0.59	0.06	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00

	Coyote							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.02	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	1.57	0.2	0.22	0.02
Chromium	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.14	0.01	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.06	0.01	0.01	0.00
Manganese	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.16	0.02	0.02	0.00
Nickel	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Thallium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.03	0.00	0.00	0.00	1.10	0.1	0.12	0.01
Vanadium	0.03	0.00	0.01	0.00	0.06	0.01	0.01	0.00
Zinc	0.00	0.00	0.00	0.00	0.40	0.04	0.07	0.01

	Bobcat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.02	0.00	0.00	0.00	0.08	0.01	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	2.06	0.2	0.23	0.02
Chromium	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.19	0.02	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.08	0.01	0.01	0.00
Manganese	0.02	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Molybdenum	0.01	0.00	0.00	0.00	0.21	0.02	0.02	0.00
Nickel	0.00	0.00	0.00	0.00	0.06	0.01	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.05	0.01	0.01	0.00
Thallium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.04	0.00	0.00	0.00	1.45	0.1	0.13	0.01
Vanadium	0.04	0.00	0.01	0.00	0.07	0.01	0.01	0.00
Zinc	0.00	0.00	0.00	0.00	0.52	0.05	0.08	0.01

	Deer Mouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	1.04	0.10	0.03	0.00	1.23	0.12	0.09	0.01
Cadmium	0.04	0.00	0.00	0.00	0.47	0.05	0.13	0.01
Chromium	0.04	0.00	0.00	0.00	0.05	0.01	0.01	0.00
Cobalt	0.11	0.01	0.01	0.00	0.13	0.01	0.01	0.00
Copper	0.18	0.02	0.01	0.00	0.69	0.07	0.16	0.02
Lead	0.04	0.00	0.00	0.00	0.05	0.01	0.01	0.00
Manganese	0.49	0.05	0.05	0.00	1.33	0.13	0.30	0.03
Molybdenum	0.29	0.03	0.02	0.00	N/A	N/A	N/A	N/A
Nickel	0.08	0.01	0.01	0.00	0.13	0.01	0.02	0.00
Selenium	0.04	0.00	0.01	0.00	0.39	0.04	0.11	0.01
Thallium	0.04	0.00	0.00	0.00	0.09	0.01	0.02	0.00
Uranium	1.93	0.2	0.11	0.01	2.57	0.3	0.31	0.03
Vanadium	2.12	0.2	0.21	0.02	N/A	N/A	N/A	N/A
Zinc	0.04	0.00	0.00	0.00	0.26	0.03	0.07	0.01

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	1.12	0.11	0.06	0.01	20.1	2.01	1.10	0.11
Cadmium	0.05	0.00	0.01	0.00	152	15.16	20.9	2.09
Chromium	0.04	0.00	0.01	0.00	9.13	0.91	1.71	0.17
Cobalt	0.11	0.01	0.02	0.00	0.78	0.08	0.11	0.01
Copper	0.19	0.02	0.02	0.00	19.5	1.95	2.08	0.21
Lead	0.04	0.00	0.01	0.00	176	17.59	25.8	2.58
Manganese	0.55	0.06	0.10	0.01	2.66	0.27	0.52	0.05
Molybdenum	0.31	0.03	0.04	0.00	12.0	1.20	1.52	0.15
Nickel	0.09	0.01	0.01	0.00	11.4	1.14	1.56	0.16
Selenium	0.05	0.00	0.01	0.00	11.2	1.12	3.47	0.35
Thallium	0.04	0.00	0.01	0.00	0.76	0.08	0.16	0.02
Uranium	2.09	0.21	0.24	0.02	4.47	0.45	0.51	0.05
Vanadium	2.28	0.23	0.44	0.04	5.94	0.59	1.16	0.12
Zinc	0.05	0.00	0.01	0.00	42.4	4.24	7.64	0.76

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 10. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Birds
AOI: East Haul Road PIA, Soils (Using Water Concentrations from Upper Eastern Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow								Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.08	0.01	0.06	0.01	0.06	0.01	0.01	0.00	0.11	0.01	0.05	0.00
Cadmium	0.00	0.00	0.00	0.00	0.27	0.03	0.25	0.02	0.00	0.00	0.00	0.00	0.17	0.02	0.14	0.01
Chromium	0.01	0.00	0.00	0.00	0.32	0.03	0.29	0.03	0.07	0.01	0.03	0.00	0.11	0.01	0.06	0.01
Cobalt	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	1.46	0.15	1.34	0.13	0.03	0.00	0.01	0.00	0.07	0.01	0.04	0.00
Lead	0.01	0.00	0.00	0.00	0.17	0.02	0.15	0.02	0.03	0.00	0.01	0.00	0.04	0.00	0.02	0.00
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.26	0.03	0.24	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Thallium	0.00	0.00	0.00	0.00	0.06	0.01	0.05	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.48	0.0	0.44	0.04	0.01	0.00	0.00	0.00	0.06	0.01	0.04	0.00

	American Robin								Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.05	0.01	0.01	0.00	0.48	0.05	0.06	0.01	0.12	0.01	0.00	0.00	0.14	0.01	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	5.45	0.55	1.72	0.17	0.01	0.00	0.00	0.00	1.22	0.12	0.17	0.02
Chromium	0.06	0.01	0.02	0.00	5.54	0.55	2.39	0.24	0.13	0.01	0.00	0.00	0.36	0.04	0.05	0.00
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.02	0.00	0.01	0.00	1.12	0.11	0.27	0.03	0.05	0.01	0.00	0.00	0.22	0.02	0.02	0.00
Lead	0.03	0.00	0.01	0.00	49.9	4.99	16.8	1.68	0.06	0.01	0.00	0.00	0.41	0.04	0.05	0.01
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Nickel	0.01	0.00	0.00	0.00	0.33	0.03	0.10	0.01	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.19	0.02	0.13	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Thallium	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.01	0.00	0.00	0.00	2.27	0.23	0.94	0.09	0.01	0.00	0.00	0.00	0.47	0.0	0.08	0.01

	American Kestrel								Spruce Grouse								Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.13	0.01	0.00	0.00	0.15	0.02	0.01	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.06	0.01	0.01	0.00	0.10	0.01	0.04	0.00
Cadmium	0.01	0.00	0.00	0.00	1.31	0.13	0.53	0.05	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.15	0.01	0.12	0.01
Chromium	0.14	0.01	0.01	0.00	0.39	0.04	0.15	0.01	0.02	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.07	0.01	0.03	0.00	0.14	0.01	0.09	0.01
Cobalt	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Copper	0.06	0.01	0.00	0.00	0.24	0.02	0.06	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.28	0.03	0.22	0.02
Lead	0.06	0.01	0.00	0.00	0.44	0.04	0.17	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.06	0.01	0.04	0.00
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.04	0.00
Thallium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Uranium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.50	0.1	0.26	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.11	0.01	0.09	0.01

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 11. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Mammals
AOI: West Haul Road PIA, Soils (Using Water Concentrations from Western Drainage)
Midnite Mine Site
Wellpinit, WA

	Meadow Vole											
	Model 1		Model 2		Model 3 - Roots		Model 3 - Veg.		Model 4 - Roots		Model 4 - Veg.	
	Conservative		Representative		Conservative		Conservative		Representative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.02	0.00	0.00	0.00	0.59	0.06	0.14	0.01	0.25	0.03	0.06	0.01
Cadmium	0.00	0.00	0.00	0.00	0.51	0.05	0.27	0.03	0.22	0.02	0.11	0.01
Chromium	0.00	0.00	0.00	0.00	0.08	0.01	0.01	0.00	0.04	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.22	0.02	0.01	0.00	0.09	0.01	0.00	0.00
Copper	0.01	0.00	0.00	0.00	0.96	0.10	0.05	0.01	0.41	0.04	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.14	0.01	0.00	0.00	0.06	0.01	0.00	0.00
Manganese	0.05	0.00	0.01	0.00	1.58	0.16	0.70	0.07	0.68	0.07	0.30	0.03
Molybdenum	0.03	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.18	0.02	0.04	0.00	0.08	0.01	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.58	0.06	0.06	0.01	0.25	0.03	0.03	0.00
Thallium	0.00	0.00	0.00	0.00	0.16	0.02	0.02	0.00	0.07	0.01	0.01	0.00
Uranium	0.38	0.04	0.06	0.01	51.0	5.10	0.63	0.06	22.0	2.20	0.17	0.02
Vanadium	0.10	0.01	0.03	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.19	0.02	0.05	0.01	0.08	0.01	0.02	0.00

	White-tailed Deer							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.09	0.01	0.00	0.00	0.12	0.01	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	0.08	0.01	0.02	0.00
Chromium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cobalt	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.05	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Lead	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Manganese	0.16	0.02	0.01	0.00	0.32	0.03	0.06	0.01
Molybdenum	0.12	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Selenium	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Thallium	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Uranium	1.60	0.16	0.02	0.00	1.66	0.17	0.04	0.00
Vanadium	0.41	0.04	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00

	Coyote							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	1.31	0.13	0.17	0.02
Chromium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.13	0.01	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Manganese	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Molybdenum	0.01	0.00	0.00	0.00	0.24	0.02	0.03	0.00
Nickel	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Thallium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.09	0.01	0.01	0.00	3.25	0.33	0.36	0.04
Vanadium	0.02	0.00	0.01	0.00	0.04	0.00	0.01	0.00
Zinc	0.00	0.00	0.00	0.00	0.36	0.04	0.08	0.01

	Bobcat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	1.73	0.2	0.18	0.02
Chromium	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.17	0.02	0.02	0.00
Lead	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Manganese	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Molybdenum	0.01	0.00	0.00	0.00	0.32	0.03	0.03	0.00
Nickel	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Thallium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.12	0.01	0.01	0.00	4.28	0.4	0.39	0.04
Vanadium	0.03	0.00	0.01	0.00	0.05	0.01	0.01	0.00
Zinc	0.00	0.00	0.00	0.00	0.47	0.05	0.08	0.01

	Deer Mouse							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.34	0.03	0.02	0.00	0.52	0.05	0.08	0.01
Cadmium	0.03	0.00	0.00	0.00	0.47	0.05	0.13	0.01
Chromium	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Cobalt	0.04	0.00	0.01	0.00	0.06	0.01	0.01	0.00
Copper	0.16	0.02	0.01	0.00	0.67	0.07	0.17	0.02
Lead	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Manganese	0.47	0.05	0.05	0.01	1.31	0.13	0.31	0.03
Molybdenum	0.42	0.04	0.02	0.00	N/A	N/A	N/A	N/A
Nickel	0.03	0.00	0.00	0.00	0.08	0.01	0.02	0.00
Selenium	0.04	0.00	0.01	0.00	0.39	0.04	0.11	0.01
Thallium	0.07	0.01	0.01	0.00	0.13	0.01	0.02	0.00
Uranium	5.70	0.6	0.32	0.03	6.34	0.6	0.52	0.05
Vanadium	1.46	0.1	0.19	0.02	N/A	N/A	N/A	N/A
Zinc	0.04	0.00	0.00	0.00	0.26	0.03	0.07	0.01

	Masked Shrew							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.36	0.04	0.04	0.00	6.51	0.65	0.79	0.08
Cadmium	0.04	0.00	0.01	0.00	127	12.69	16.6	1.66
Chromium	0.03	0.00	0.01	0.00	6.03	0.60	1.40	0.14
Cobalt	0.04	0.00	0.01	0.00	0.30	0.03	0.08	0.01
Copper	0.17	0.02	0.02	0.00	17.4	1.74	2.19	0.22
Lead	0.02	0.00	0.01	0.00	99.2	9.92	26.9	2.69
Manganese	0.53	0.05	0.12	0.01	2.52	0.25	0.54	0.05
Molybdenum	0.46	0.05	0.05	0.01	17.8	1.78	1.99	0.20
Nickel	0.04	0.00	0.01	0.00	4.70	0.47	1.11	0.11
Selenium	0.04	0.00	0.01	0.00	10.0	1.00	3.11	0.31
Thallium	0.08	0.01	0.01	0.00	1.49	0.15	0.23	0.02
Uranium	6.15	0.61	0.69	0.07	13.2	1.32	1.47	0.15
Vanadium	1.58	0.16	0.40	0.04	4.11	0.41	1.05	0.10
Zinc	0.04	0.00	0.01	0.00	38.0	3.80	8.09	0.81

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 12. Summary of Chronic LOAELs and Adjusted Hazard Quotients for Birds
AOI: West Haul Road PIA, Soils (Using Water Concentrations from Western Drainage)
Midnite Mine Site
Wellpinit, WA

	Cliff Swallow								Song Sparrow (Herbivore)							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.00	0.00	0.00	0.00	0.07	0.01	0.06	0.01	0.02	0.00	0.01	0.00	0.07	0.01	0.05	0.00
Cadmium	0.00	0.00	0.00	0.00	0.27	0.03	0.25	0.02	0.00	0.00	0.00	0.00	0.17	0.02	0.14	0.01
Chromium	0.01	0.00	0.00	0.00	0.32	0.03	0.28	0.03	0.05	0.00	0.02	0.00	0.08	0.01	0.06	0.01
Cobalt	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.01	0.00	0.00	0.00	1.46	0.15	1.34	0.13	0.03	0.00	0.01	0.00	0.07	0.01	0.04	0.00
Lead	0.00	0.00	0.00	0.00	0.17	0.02	0.15	0.02	0.02	0.00	0.01	0.00	0.03	0.00	0.02	0.00
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Selenium	0.00	0.00	0.00	0.00	0.26	0.03	0.24	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Thallium	0.00	0.00	0.00	0.00	0.06	0.01	0.05	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.48	0.0	0.44	0.04	0.01	0.00	0.00	0.00	0.06	0.01	0.04	0.00

	American Robin								Great Horned Owl							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.02	0.00	0.00	0.00	0.16	0.02	0.04	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	4.56	0.46	1.37	0.14	0.01	0.00	0.00	0.00	1.02	0.10	0.14	0.01
Chromium	0.04	0.00	0.02	0.00	3.66	0.37	1.95	0.19	0.08	0.01	0.00	0.00	0.24	0.02	0.04	0.00
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Copper	0.02	0.00	0.01	0.00	1.00	0.10	0.29	0.03	0.05	0.00	0.00	0.00	0.20	0.02	0.02	0.00
Lead	0.01	0.00	0.01	0.00	28.1	2.81	17.5	1.75	0.03	0.00	0.00	0.00	0.23	0.02	0.06	0.01
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.00	0.00	0.00	0.00	0.05	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Nickel	0.00	0.00	0.00	0.00	0.13	0.01	0.07	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.17	0.02	0.12	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Thallium	0.01	0.00	0.00	0.00	0.05	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Zinc	0.01	0.00	0.00	0.00	2.04	0.20	1.00	0.10	0.01	0.00	0.00	0.00	0.42	0.0	0.09	0.01

	American Kestrel								Spruce Grouse							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.04	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	1.10	0.11	0.42	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00
Chromium	0.09	0.01	0.01	0.00	0.26	0.03	0.12	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Cobalt	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper	0.05	0.01	0.00	0.00	0.21	0.02	0.06	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Lead	0.03	0.00	0.00	0.00	0.25	0.02	0.17	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Manganese	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Molybdenum	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Thallium	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.45	0.0	0.28	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00

	Song Sparrow (Omnivore)							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Arsenic	0.02	0.00	0.01	0.00	0.06	0.01	0.04	0.00
Cadmium	0.00	0.00	0.00	0.00	0.15	0.01	0.12	0.01
Chromium	0.05	0.00	0.02	0.00	0.12	0.01	0.08	0.01
Cobalt	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Copper	0.03	0.00	0.01	0.00	0.28	0.03	0.22	0.02
Lead	0.02	0.00	0.01	0.00	0.05	0.00	0.04	0.00
Manganese	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Molybdenum	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Selenium	0.00	0.00	0.00	0.00	0.05	0.01	0.04	0.00
Thallium	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.11	0.01	0.09	0.01

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 13. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculation
AOI: Pit 3, Instream Sediments
Midnite Mine Site
Wellpinit, WA

Analyte	Raccoon Model 1 Conservative LOAEL HQ	Raccoon Model 1 Conservative AHQ	Raccoon Model 2 Representative LOAEL HQ	Raccoon Model 2 Representative AHQ	Raccoon Model 3 Conservative LOAEL HQ	Raccoon Model 3 Conservative AHQ	Raccoon Model 4 Representative LOAEL HQ	Raccoon Model 4 Representative AHQ
Antimony	0.01	0.00	0.00	0.00				
Arsenic	0.04	0.00	0.00	0.00				
Barium	0.07	0.01	0.00	0.00				
Beryllium	0.01	0.00	0.00	0.00				
Cadmium	0.00	0.00	0.00	0.00				
Cobalt	0.03	0.00	0.01	0.00				
Copper	0.02	0.00	0.00	0.00				
Manganese	0.07	0.01	0.03	0.00				
Nickel	0.02	0.00	0.00	0.00				
Selenium	0.04	0.00	0.01	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	**1.63**	0.16	0.38	0.04				
Vanadium	0.13	0.01	0.01	0.00				
Zinc	0.01	0.00	0.00	0.00				

Analyte	Mink Model 1 Conservative LOAEL HQ	Mink Model 1 Conservative AHQ	Mink Model 2 Representative LOAEL HQ	Mink Model 2 Representative AHQ	Mink Model 3 Conservative LOAEL HQ	Mink Model 3 Conservative AHQ	Mink Model 4 Representative LOAEL HQ	Mink Model 4 Representative AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	**1.82**	0.18	0.35	0.03
Cobalt	0.01	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Copper	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.07	0.01	0.05	0.00	N/A	N/A	N/A	N/A
Nickel	0.01	0.00	0.01	0.00	**2.89**	0.29	0.57	0.06
Selenium	0.04	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.89	0.09	0.52	0.05	**197**	**19.69**	**44.2**	**4.42**
Vanadium	0.03	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A

Analyte	Mallard Model 1 Conservative LOAEL HQ	Mallard Model 1 Conservative AHQ	Mallard Model 2 Representative LOAEL HQ	Mallard Model 2 Representative AHQ	Mallard Model 3 Conservative LOAEL HQ	Mallard Model 3 Conservative AHQ	Mallard Model 4 Representative LOAEL HQ	Mallard Model 4 Representative AHQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.19	0.02	0.00	0.00				
Barium	0.10	0.01	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.00	0.00	0.00				
Cobalt	0.12	0.01	0.00	0.00				
Copper	0.25	0.02	0.01	0.00				
Manganese	0.01	0.00	0.00	0.00				
Nickel	0.09	0.01	0.00	0.00				
Selenium	0.07	0.01	0.00	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.05	0.00	0.00	0.00				
Vanadium	0.03	0.00	0.00	0.00				
Zinc	0.12	0.01	0.00	0.00				

Analyte	Wilson's Snipe Model 1 Conservative LOAEL HQ	Wilson's Snipe Model 1 Conservative A/L HQ	Wilson's Snipe Model 2 Representative LOAEL HQ	Wilson's Snipe Model 2 Representative A/L HQ	Wilson's Snipe Model 3 Conservative LOAEL HQ	Wilson's Snipe Model 3 Conservative A/L HQ	Wilson's Snipe Model 4 Representative LOAEL HQ	Wilson's Snipe Model 4 Representative A/L HQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.28	0.03	0.06	0.01				
Barium	0.15	0.01	0.03	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.00	0.00	0.00				
Cobalt	0.17	0.02	0.05	0.01				
Copper	0.36	0.04	0.10	0.01				
Manganese	0.02	0.00	0.01	0.00				
Nickel	0.14	0.01	0.04	0.00				
Selenium	0.10	0.01	0.04	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.07	0.01	0.02	0.00				
Vanadium	0.04	0.00	0.01	0.00				
Zinc	0.17	0.02	0.06	0.01				

Analyte	Great Blue Heron Model 1 Conservative LOAEL HQ	Great Blue Heron Model 1 Conservative A/L HQ	Great Blue Heron Model 2 Representative LOAEL HQ	Great Blue Heron Model 2 Representative A/L HQ	Great Blue Heron Model 3 Conservative LOAEL HQ	Great Blue Heron Model 3 Conservative A/L HQ	Great Blue Heron Model 4 Representative LOAEL HQ	Great Blue Heron Model 4 Representative A/L HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.25	0.02	0.11	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.31	0.03	0.14	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.12	0.01	0.07	0.01
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

Analyte	Bald Eagle Model 1 Conservative LOAEL HQ	Bald Eagle Model 1 Conservative A/L HQ	Bald Eagle Model 2 Representative LOAEL HQ	Bald Eagle Model 2 Representative A/L HQ	Bald Eagle Model 3 Conservative LOAEL HQ	Bald Eagle Model 3 Conservative A/L HQ	Bald Eagle Model 4 Representative LOAEL HQ	Bald Eagle Model 4 Representative A/L HQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.22	0.02	0.10	0.01
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.28	0.03	0.13	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.11	0.01	0.06	0.01
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 14. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Pit 4, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon								Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Arsenic	0.02	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.09	0.01	0.00	0.00				
Barium	0.02	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00				
Beryllium	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Cobalt	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00				
Copper	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.01	0.00	0.00				
Manganese	0.04	0.00	0.00	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00				
Nickel	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.78	0.08	0.03	0.00	0.04	0.00	0.00	0.00				
Selenium	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.00	0.00	0.00				
Silver	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00				
Uranium	**1.06**	0.1	0.10	0.01					0.30	0.03	0.10	0.01	**27.2**	**2.72**	**6.56**	0.7	0.04	0.00	0.00	0.00				
Vanadium	0.14	0.01	0.01	0.00					0.03	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00				
Zinc	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00				

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.13	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.06	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.10	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.02	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.06	0.01	0.02	0.00					0.00	0.00			0.08	0.01	0.01	0.00	0.00	0.00			0.08	0.01	0.01	0.00
Selenium	0.07	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.06	0.01	0.01	0.00					0.00	0.00			0.02	0.00	0.01	0.00	0.00	0.00			0.02	0.00	0.01	0.00
Vanadium	0.05	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 15. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Pollution Control Pond, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon								Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Arsenic	0.02	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.09	0.01	0.00	0.00				
Barium	0.09	0.01	0.01	0.00					0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.13	0.01	0.00	0.00				
Beryllium	0.03	0.00	0.00	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.00	0.00	0.00					0.01	0.00	0.00	0.00	**1.83**	0.2	0.36	0.04	0.27	0.03	0.00	0.00				
Cobalt	0.06	0.01	0.01	0.00					0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.31	0.03	0.01	0.00				
Copper	0.14	0.01	0.01	0.00					0.03	0.00	0.01	0.00	N/A	N/A	N/A	N/A	**1.82**	0.18	0.03	0.00				
Manganese	0.15	0.02	0.03	0.00					0.09	0.01	0.05	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00				
Nickel	0.12	0.01	0.01	0.00					0.03	0.00	0.01	0.00	**3.30**	0.33	0.64	0.06	0.77	0.08	0.01	0.00				
Selenium	0.04	0.00	0.00	0.00					0.04	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.06	0.01	0.00	0.00				
Silver	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00				
Uranium	**8.06**	0.8	0.71	0.07					**2.39**	0.24	0.72	0.07	**247**	**25**	**45.5**	**4.55**	0.29	0.03	0.01	0.00				
Vanadium	0.05	0.01	0.00	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00				
Zinc	0.03	0.00	0.00	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.36	0.04	0.01	0.00				

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.14	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.20	0.02	0.04	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.39	0.04	0.08	0.01					0.00	0.00			0.25	0.02	0.11	0.01	0.00	0.00			0.22	0.02	0.11	0.01
Cobalt	0.45	0.05	0.10	0.01					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	**2.67**	0.27	0.55	0.05					0.01	0.00			N/A	N/A	N/A	N/A	0.01	0.00			N/A	N/A	N/A	N/A
Manganese	0.05	0.01	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	**1.14**	0.11	0.23	0.02					0.00	0.00			0.35	0.04	0.16	0.02	0.00	0.00			0.32	0.03	0.15	0.01
Selenium	0.09	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.43	0.04	0.09	0.01					0.00	0.00			0.16	0.02	0.07	0.01	0.00	0.00			0.14	0.01	0.06	0.01
Vanadium	0.02	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.53	0.1	0.11	0.01					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 16. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Blood Pool, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.02	0.00	0.00	0.00				
Arsenic	0.05	0.01	0.00	0.00				
Barium	0.02	0.00	0.00	0.00				
Beryllium	0.00	0.00	0.00	0.00				
Cadmium	0.00	0.00	0.00	0.00				
Cobalt	0.01	0.00	0.00	0.00				
Copper	0.02	0.00	0.00	0.00				
Manganese	0.02	0.00	0.01	0.00				
Nickel	0.01	0.00	0.00	0.00				
Selenium	0.02	0.00	0.00	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.28	0.03	0.10	0.01				
Vanadium	0.21	0.02	0.02	0.00				
Zinc	0.00	0.00	0.00	0.00				

	Mink							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.23	0.02	0.05	0.00
Cobalt	0.01	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Copper	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	**1.50**	0.15	0.28	0.03
Selenium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.25	0.02	0.14	0.01	**67.0**	**6.70**	**13.1**	**1.31**
Vanadium	0.04	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A

	Mallard							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.26	0.03	0.01	0.00				
Barium	0.03	0.00	0.00	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.00	0.00	0.00				
Cobalt	0.02	0.00	0.00	0.00				
Copper	0.22	0.02	0.01	0.00				
Manganese	0.00	0.00	0.00	0.00				
Nickel	0.03	0.00	0.00	0.00				
Selenium	0.06	0.01	0.00	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.01	0.00	0.00	0.00				
Vanadium	0.05	0.00	0.00	0.00				
Zinc	0.03	0.00	0.00	0.00				

	Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.39	0.04	0.13	0.01				
Barium	0.04	0.00	0.01	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.01	0.00	0.00	0.00				
Cobalt	0.03	0.00	0.01	0.00				
Copper	0.32	0.03	0.11	0.01				
Manganese	0.00	0.00	0.00	0.00				
Nickel	0.05	0.00	0.02	0.00				
Selenium	0.09	0.01	0.03	0.00				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.01	0.00	0.00	0.00				
Vanadium	0.07	0.01	0.02	0.00				
Zinc	0.04	0.00	0.02	0.00				

	Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.03	0.00	0.02	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.16	0.02	0.07	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.04	0.00	0.02	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.03	0.00	0.01	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.14	0.01	0.07	0.01
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.04	0.00	0.02	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 17. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Outfall, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Raccoon								Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.02	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Arsenic	0.06	0.01	0.01	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.29	0.03	0.01	0.00				
Barium	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00				
Beryllium	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Cadmium	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00				
Cobalt	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00				
Copper	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.14	0.01	0.00	0.00				
Manganese	0.08	0.01	0.01	0.00					0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00				
Nickel	0.01	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00				
Selenium	0.02	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.01	0.00	0.00				
Silver	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00				
Uranium	0.53	0.05	0.06	0.01					0.12	0.01	0.04	0.00	**2.20**	0.2	0.37	0.04	0.02	0.00	0.00	0.00				
Vanadium	0.10	0.01	0.01	0.00					0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00				
Zinc	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.01	0.00	0.00				

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.43	0.04	0.17	0.02					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.03	0.00	0.01	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.06	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.20	0.02	0.08	0.01					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	N/A	N/A	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.04	0.00	0.02	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.06	0.01	0.04	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.10	0.01	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00	0.01	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.03	0.00	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 18. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Western Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	0.18	0.02	0.16	0.02
Barium	0.01	0.00	0.00	0.00	0.49	0.05	0.45	0.04
Beryllium	0.00	0.00	0.00	0.00	0.69	0.07	0.63	0.06
Cadmium	0.00	0.00	0.00	0.00	0.22	0.02	0.20	0.02
Cobalt	0.00	0.00	0.00	0.00	0.47	0.05	0.43	0.04
Copper	0.00	0.00	0.00	0.00	0.70	0.07	0.63	0.06
Manganese	0.05	0.00	0.02	0.00	**21.7**	**2.17**	**19.7**	**1.97**
Nickel	0.00	0.00	0.00	0.00	0.57	0.06	0.52	0.05
Selenium	0.05	0.01	0.03	0.00	0.46	0.05	0.40	0.04
Silver	0.00	0.00	0.00	0.00	0.45	0.04	0.41	0.04
Uranium	0.20	0.02	0.09	0.01	**79.5**	**7.95**	**72.3**	**7.23**
Vanadium	0.02	0.00	0.02	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.17	0.02	0.16	0.02

	Raccoon							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Barium	0.01	0.00	0.00	0.00	0.07	0.01	0.02	0.00
Beryllium	0.00	0.00	0.00	0.00	0.08	0.01	0.03	0.00
Cadmium	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.00
Cobalt	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.00
Copper	0.00	0.00	0.00	0.00	0.11	0.01	0.03	0.00
Manganese	0.08	0.01	0.01	0.00	**2.59**	0.26	0.82	0.08
Nickel	0.01	0.00	0.00	0.00	0.07	0.01	0.02	0.00
Selenium	0.10	0.01	0.01	0.00	0.21	0.02	0.04	0.00
Silver	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.00
Uranium	0.38	0.04	0.02	0.00	**9.55**	1.0	**3.00**	0.30
Vanadium	0.04	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00

	Mink							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.13	0.01	0.02	0.00
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Manganese	0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00	0.48	0.05	0.09	0.01
Selenium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Uranium	0.08	0.01	0.01	0.00	0.92	0.09	0.3	0.03
Vanadium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A

	Mallard							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Barium	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.00	0.00	0.00	0.06	0.01	0.03	0.00
Cobalt	0.02	0.00	0.00	0.00	0.06	0.01	0.03	0.00
Copper	0.05	0.00	0.00	0.00	0.19	0.02	0.11	0.01
Manganese	0.03	0.00	0.00	0.00	0.13	0.01	0.08	0.01
Nickel	0.03	0.00	0.00	0.00	0.08	0.01	0.04	0.00
Selenium	0.40	0.04	0.01	0.00	0.43	0.04	0.03	0.00
Silver	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.06	0.01	0.03	0.00
Vanadium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.03	0.00	0.00	0.00	0.07	0.01	0.03	0.00

	Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A				
Arsenic	0.03	0.00	0.01	0.00				
Barium	0.02	0.00	0.01	0.00				
Beryllium	N/A	N/A	N/A	N/A				
Cadmium	0.03	0.00	0.01	0.00				
Cobalt	0.03	0.00	0.01	0.00				
Copper	0.07	0.01	0.02	0.00				
Manganese	0.04	0.00	0.01	0.00				
Nickel	0.04	0.00	0.01	0.00				
Selenium	0.59	0.06	0.15	0.02				
Silver	0.00	0.00	0.00	0.00				
Uranium	0.02	0.00	0.00	0.00				
Vanadium	0.01	0.00	0.00	0.00				
Zinc	0.05	0.00	0.01	0.00				

	Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.00	0.01	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.05	0.01	0.02	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.02	0.00	0.01	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.05	0.00	0.02	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 19. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Central Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	0.18	0.02	0.10	0.01	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Barium	0.01	0.00	0.01	0.00	0.50	0.05	0.46	0.05	0.02	0.00	0.00	0.00	0.07	0.01	0.02	0.00
Beryllium	0.00	0.00	0.00	0.00	0.69	0.07	0.15	0.02	0.00	0.00	0.00	0.00	0.08	0.01	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	0.23	0.02	0.51	0.05	0.01	0.00	0.00	0.00	0.06	0.01	0.03	0.00
Cobalt	0.02	0.00	0.01	0.00	0.49	0.05	0.17	0.02	0.03	0.00	0.00	0.00	0.09	0.01	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.70	0.07	0.26	0.03	0.01	0.00	0.00	0.00	0.11	0.01	0.02	0.00
Manganese	0.10	0.01	0.06	0.01	**21.71**	**2.17**	**19.7**	**1.97**	0.15	0.01	0.03	0.00	**2.66**	0.27	0.85	0.08
Nickel	0.02	0.00	0.01	0.00	0.59	0.06	0.49	0.05	0.04	0.00	0.00	0.00	0.11	0.01	0.03	0.00
Selenium	0.07	0.01	0.04	0.00	0.48	0.05	0.40	0.04	0.14	0.01	0.01	0.00	0.24	0.02	0.04	0.00
Silver	0.00	0.00	0.00	0.00	0.45	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Uranium	**2.49**	0.2	**1.18**	0.12	**81.76**	**8.18**	**73.4**	**7.34**	**4.75**	0.47	0.28	0.03	**13.9**	**1.39**	**3.26**	0.33
Vanadium	0.05	0.00	0.02	0.00	N/A	N/A	N/A	N/A	0.09	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.01	0.00	0.18	0.02	0.16	0.02	0.02	0.00	0.00	0.00	0.06	0.01	0.01	0.00

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.05	0.01	0.01	0.00
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	**1.38**	0.14	0.32	0.03	0.07	0.01	0.00	0.00	0.10	0.01	0.03	0.00
Cobalt	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.18	0.02	0.00	0.00	0.22	0.02	0.03	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.01	0.00	0.00	0.21	0.02	0.11	0.01
Manganese	0.07	0.01	0.04	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.14	0.01	0.08	0.01
Nickel	0.01	0.00	0.01	0.00	**1.64**	0.16	0.40	0.04	0.24	0.02	0.01	0.00	0.29	0.03	0.05	0.00
Selenium	0.03	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.52	0.05	0.01	0.00	0.55	0.06	0.03	0.00
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	**1.02**	0.10	0.17	0.02	**6.96**	0.70	**1.08**	0.1	0.18	0.02	0.00	0.00	0.22	0.02	0.04	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.22	0.02	0.00	0.00	0.26	0.03	0.04	0.00

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.06	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.10	0.01	0.03	0.00					0.00	0.00			0.19	0.02	0.10	0.01	0.00	0.00			0.17	0.02	0.09	0.01
Cobalt	0.27	0.03	0.06	0.01					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.10	0.01	0.04	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.06	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.35	0.03	0.09	0.01					0.00	0.00			0.18	0.02	0.10	0.01	0.00	0.00			0.16	0.02	0.09	0.01
Selenium	0.77	0.08	0.16	0.02					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.27	0.03	0.06	0.01					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.32	0.03	0.08	0.01					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available

HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 20. Summary of Hazard Quotients Based on Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Upper Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.00	0.00	0.11	0.01	0.10	0.01	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Barium	0.01	0.00	0.01	0.00	0.50	0.05	0.46	0.05	0.02	0.00	0.00	0.00	0.09	0.01	0.03	0.00
Beryllium	0.00	0.00	0.00	0.00	0.16	0.02	0.15	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	0.56	0.06	0.51	0.05	0.00	0.00	0.00	0.00	0.16	0.02	0.05	0.00
Cobalt	0.00	0.00	0.00	0.00	0.18	0.02	0.16	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.29	0.03	0.26	0.03	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Manganese	0.03	0.00	0.01	0.00	**11.1**	**1.11**	**10.1**	**1.01**	0.06	0.01	0.00	0.00	**1.47**	0.15	0.46	0.05
Nickel	0.00	0.00	0.00	0.00	0.53	0.05	0.48	0.05	0.01	0.00	0.00	0.00	0.08	0.01	0.02	0.00
Selenium	0.01	0.00	0.01	0.00	0.41	0.04	0.37	0.04	0.01	0.00	0.00	0.00	0.82	0.08	0.26	0.03
Silver	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.06	0.01	0.02	0.00	**8.21**	0.82	**7.44**	0.74	0.10	0.01	0.01	0.00	**1.13**	0.1	0.34	0.03
Vanadium	0.06	0.01	0.03	0.00	N/A	N/A	N/A	N/A	0.11	0.01	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.25	0.02	0.22	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.01	0.00	0.00	0.07	0.01	0.01	0.00
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.11	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.12	0.01	0.08	0.01
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.06	0.01	0.01	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.01	0.00	0.00	0.13	0.01	0.05	0.00
Manganese	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	0.07	0.01	0.04	0.00
Nickel	0.00	0.00	0.00	0.00	0.38	0.04	0.01	0.00	0.04	0.00	0.00	0.00	0.09	0.01	0.04	0.00
Selenium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.01	0.00	0.00	0.22	0.02	0.13	0.01
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.03	0.00	0.00	0.00	**1.09**	0.1	0.13	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.09	0.01	0.04	0.00

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.09	0.01	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.02	0.00	0.01	0.00					0.00	0.00			0.02	0.00	0.00	0.00	0.00	0.00			0.01	0.00	0.00	0.00
Cobalt	0.06	0.01	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.11	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.05	0.01	0.01	0.00					0.00	0.00			0.04	0.00	0.00	0.00	0.00	0.00			0.04	0.00	0.00	0.00
Selenium	0.07	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.01	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.05	0.01	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 21. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Lower Eastern Drainage, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.00	0.00	0.11	0.01	0.10	0.01	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Barium	0.02	0.00	0.01	0.00	0.51	0.05	0.46	0.05	0.03	0.00	0.00	0.00	0.11	0.01	0.03	0.00
Beryllium	0.00	0.00	0.00	0.00	0.17	0.02	0.15	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Cadmium	0.01	0.00	0.01	0.00	0.57	0.06	0.52	0.05	0.03	0.00	0.00	0.00	0.18	0.02	0.05	0.01
Cobalt	0.01	0.00	0.00	0.00	0.18	0.02	0.16	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.29	0.03	0.26	0.03	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Manganese	0.31	0.03	0.19	0.02	**11.39**	**1.14**	**10.3**	**1.03**	0.59	0.06	0.04	0.00	**2.00**	0.20	0.50	0.05
Nickel	0.03	0.00	0.01	0.00	0.55	0.06	0.49	0.05	0.05	0.00	0.00	0.00	0.12	0.01	0.03	0.00
Selenium	0.22	0.02	0.11	0.01	0.62	0.06	0.48	0.05	0.42	0.04	0.03	0.00	**1.22**	0.12	0.29	0.03
Silver	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.06	0.01	0.03	0.00	**8.21**	0.82	**7.46**	0.75	0.11	0.01	0.01	0.00	**1.14**	0.11	0.34	0.03
Vanadium	0.05	0.01	0.05	0.00	N/A	N/A	N/A	N/A	0.10	0.01	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.25	0.02	0.23	0.02	0.01	0.00	0.00	0.00	0.05	0.01	0.01	0.00

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.01	0.00	0.00	0.06	0.01	0.01	0.00
Barium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.00	0.00	0.00	0.06	0.01	0.01	0.02
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.01	0.00	0.00	0.00	0.07	0.01	0.01	0.00	0.23	0.02	0.00	0.00	0.33	0.03	0.08	0.01
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.01	0.00	0.00	0.08	0.01	0.01	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.07	0.01	0.00	0.00	0.13	0.01	0.05	0.00
Manganese	0.13	0.01	0.03	0.00	N/A	N/A	N/A	N/A	0.20	0.02	0.00	0.00	0.25	0.03	0.05	0.00
Nickel	0.01	0.00	0.00	0.00	0.14	0.01	0.02	0.00	0.31	0.03	0.01	0.00	0.36	0.04	0.05	0.00
Selenium	0.09	0.01	0.02	0.00	N/A	N/A	N/A	N/A	**1.61**	0.16	0.03	0.00	**1.77**	0.18	0.16	0.02
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.03	0.00	0.01	0.00	0.66	0.07	0.13	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.14	0.01	0.00	0.00	0.19	0.02	0.04	0.00

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.08	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.07	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.33	0.03	0.08	0.01					0.00	0.00			0.01	0.00	0.00	0.00
Cobalt	0.10	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.11	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.29	0.03	0.08	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.46	0.05	0.11	0.01					0.00	0.00			0.02	0.00	0.00	0.00
Selenium	**2.36**	0.24	0.53	0.05					0.01	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.01	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.21	0.02	0.05	0.00					0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.01	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.01	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 22. Summary of Chronic LOAELs and Adjusted HazardQuotient Calculations
AOI: Upper Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	0.14	0.01	0.13	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Barium	0.00	0.00	0.00	0.00	**3.06**	0.31	**2.79**	0.28	0.01	0.00	0.00	0.00	0.43	0.04	0.14	0.01
Beryllium	0.00	0.00	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cobalt	0.00	0.00	0.00	0.00	0.09	0.01	0.08	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Copper	0.00	0.00	0.00	0.00	0.30	0.03	0.28	0.03	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.00
Manganese	0.09	0.01	0.01	0.00	**4.57**	0.46	**4.08**	0.41	0.18	0.02	0.00	0.00	0.76	0.08	0.19	0.02
Nickel	0.00	0.00	0.00	0.00	0.07	0.01	0.07	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Selenium	0.03	0.00	0.03	0.00	0.43	0.04	0.39	0.04	0.05	0.01	0.01	0.00	0.14	0.01	0.03	0.00
Silver	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.01	0.00	0.01	0.00	**1.59**	0.16	**1.44**	0.14	0.03	0.00	0.00	0.00	0.25	0.02	0.07	0.01
Vanadium	0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.07	0.01	0.06	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	0.08	0.01	0.05	0.01
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	0.08	0.01	0.06	0.01
Manganese	0.04	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.01	0.00	0.00	0.08	0.01	0.02	0.00
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Selenium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.20	0.02	0.01	0.00	0.23	0.02	0.03	0.00
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.58	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	0.04	0.00	0.02	0.00

	Wilson's Snipe								Great Blue Heron							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.03	0.12	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.02	0.04	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.03	0.00	0.00	0.00					0.00	0.00			0.01	0.00	0.00	0.00
Cobalt	0.04	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.01	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.09	0.01	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.05	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.30	0.03	0.12	0.01					0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.01	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.02	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A

	Bald Eagle							
	Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 23. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Middle Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.03	0.00	0.00	0.00	0.31	0.03	0.26	0.03	0.05	0.01	0.00	0.00	0.09	0.01	0.01	0.00
Barium	0.04	0.00	0.00	0.00	**1.69**	0.17	**1.51**	0.15	0.08	0.01	0.00	0.00	0.29	0.03	0.07	0.01
Beryllium	0.00	0.00	0.00	0.00	0.26	0.03	0.24	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Cadmium	0.01	0.00	0.00	0.00	**1.90**	0.19	**1.72**	0.17	0.03	0.00	0.00	0.00	0.27	0.03	0.08	0.01
Cobalt	0.02	0.00	0.00	0.00	0.21	0.02	0.18	0.02	0.05	0.00	0.00	0.00	0.07	0.01	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.34	0.03	0.31	0.03	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.00
Manganese	0.80	0.08	0.06	0.01	**49.6**	**4.96**	**44.5**	**4.45**	**1.54**	0.15	0.01	0.00	**7.44**	0.74	**1.93**	0.19
Nickel	0.04	0.00	0.00	0.00	**1.16**	0.12	**1.02**	0.10	0.07	0.01	0.00	0.00	0.21	0.02	0.05	0.00
Selenium	0.02	0.00	0.04	0.00	0.69	0.07	0.65	0.06	0.04	0.00	0.01	0.00	0.15	0.02	0.05	0.00
Silver	0.00	0.00	0.00	0.00	0.06	0.01	0.06	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.03	0.00	0.01	0.00	**7.35**	0.74	**6.68**	0.67	0.06	0.01	0.00	0.00	**1.04**	0.10	0.32	0.03
Vanadium	0.04	0.00	0.02	0.00	N/A	N/A	N/A	N/A	0.08	0.01	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00	0.52	0.05	0.46	0.05	0.02	0.00	0.00	0.00	0.09	0.01	0.02	0.00

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.28	0.03	0.00	0.00	0.30	0.03	0.02	0.00
Barium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.13	0.01	0.00	0.00	0.16	0.02	0.03	0.00
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.01	0.00	0.00	0.00	0.07	0.01	0.01	0.00	0.23	0.02	0.00	0.00	0.45	0.05	0.18	0.02
Cobalt	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.25	0.03	0.00	0.00	0.27	0.03	0.01	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.00	0.00	0.00	0.12	0.01	0.06	0.01
Manganese	0.33	0.03	0.01	0.00	N/A	N/A	N/A	N/A	0.52	0.05	0.00	0.00	0.75	0.1	0.18	0.02
Nickel	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.47	0.05	0.00	0.00	0.57	0.06	0.08	0.01
Selenium	0.01	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.14	0.01	0.01	0.00	0.18	0.02	0.04	0.00
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.02	0.00	0.00	0.00	0.83	0.08	0.05	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	0.02	0.00	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.19	0.02	0.00	0.00	0.28	0.0	0.08	0.01

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.41	0.04	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.19	0.02	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.33	0.03	0.01	0.00					0.00	0.00			0.01	0.00	0.00	0.00	0.00	0.00			0.01	0.00	0.00	0.00
Cobalt	0.37	0.04	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.07	0.01	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.77	0.08	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.69	0.07	0.03	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.21	0.02	0.16	0.02					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.27	0.03	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 24. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Lower Blue Creek, Instream Sediments
Midnite Mine Site
Wellpinit, WA

Analyte	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	0.28	0.03	0.26	0.03	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.00
Barium	0.01	0.00	0.00	0.00	**1.66**	0.17	**1.51**	0.15	0.02	0.00	0.00	0.00	0.22	0.02	0.07	0.01
Beryllium	0.00	0.00	0.00	0.00	0.26	0.03	0.24	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	**1.89**	0.19	**1.72**	0.17	0.00	0.00	0.00	0.00	0.24	0.02	0.08	0.01
Cobalt	0.00	0.00	0.00	0.00	0.19	0.02	0.17	0.02	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.34	0.03	0.31	0.03	0.00	0.00	0.00	0.00	0.06	0.01	0.02	0.00
Manganese	0.05	0.00	0.02	0.00	**48.8**	**4.88**	**44.4**	**4.44**	0.09	0.01	0.00	0.00	**5.99**	0.60	**1.92**	0.19
Nickel	0.00	0.00	0.00	0.00	**1.12**	0.11	**1.02**	0.10	0.01	0.00	0.00	0.00	0.15	0.01	0.05	0.00
Selenium	0.01	0.00	0.01	0.00	0.68	0.07	0.62	0.06	0.01	0.00	0.00	0.00	0.13	0.01	0.04	0.00
Silver	0.00	0.00	0.00	0.00	0.06	0.01	0.06	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.02	0.00	0.01	0.00	**7.34**	0.73	**6.68**	0.67	0.04	0.00	0.00	0.00	**1.02**	0.10	0.32	0.03
Vanadium	0.04	0.00	0.03	0.00	N/A	N/A	N/A	N/A	0.07	0.01	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.51	0.05	0.46	0.05	0.00	0.00	0.00	0.00	0.08	0.01	0.02	0.00

Analyte	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.06	0.01	0.02	0.00
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	0.06	0.01	0.03	0.00
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.25	0.02	0.18	0.02
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.11	0.01	0.06	0.01
Manganese	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	0.26	0.03	0.18	0.02
Nickel	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.16	0.02	0.08	0.01
Selenium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.01	0.00	0.00	0.10	0.01	0.04	0.00
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.01	0.00	0.00	0.00	0.23	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.04	0.00	0.00	0.00	0.14	0.01	0.08	0.01

Analyte	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.06	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.03	0.00	0.00	0.00					0.00	0.00			0.01	0.00	0.00	0.00	0.00	0.00			0.01	0.00	0.00	0.00
Cobalt	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.06	0.01	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.04	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.08	0.01	0.01	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.08	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.02	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.06	0.01	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 25. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: FDR Lake, Instream Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Raccoon							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	0.28	0.03	0.26	0.03	0.01	0.00	0.00	0.00	0.05	0.00	0.01	0.00
Barium	0.01	0.00	0.00	0.00	**1.66**	0.17	**1.51**	0.15	0.01	0.00	0.00	0.00	0.22	0.02	0.07	0.01
Beryllium	0.00	0.00	0.00	0.00	0.26	0.03	0.24	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Cadmium	0.00	0.00	0.00	0.00	**1.89**	0.19	**1.72**	0.17	0.00	0.00	0.00	0.00	0.24	0.02	0.08	0.01
Cobalt	0.00	0.00	0.00	0.00	0.19	0.02	0.17	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	0.34	0.03	0.31	0.03	0.00	0.00	0.00	0.00	0.05	0.01	0.02	0.00
Manganese	0.00	0.00	0.00	0.00	**48.8**	**4.88**	**44.4**	**4.44**	0.01	0.00	0.00	0.00	**5.91**	0.59	**1.92**	0.19
Nickel	0.00	0.00	0.00	0.00	**1.12**	0.11	**1.02**	0.10	0.00	0.00	0.00	0.00	0.14	0.01	0.05	0.00
Selenium	0.01	0.00	0.01	0.00	0.68	0.07	0.62	0.06	0.01	0.00	0.00	0.00	0.13	0.01	0.04	0.00
Silver	0.00	0.00	0.00	0.00	0.06	0.01	0.06	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	**7.32**	0.73	**6.67**	0.67	0.00	0.00	0.00	0.00	0.98	0.10	0.32	0.03
Vanadium	0.04	0.00	0.04	0.00	N/A	N/A	N/A	N/A	0.08	0.01	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	0.51	0.05	0.47	0.05	0.00	0.00	0.00	0.00	0.08	0.01	0.03	0.00

	Mink								Mallard							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.00	0.00	0.00	0.07	0.01	0.02	0.00
Barium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	0.05	0.01	0.03	0.00
Beryllium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.02	0.18	0.02
Cobalt	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Copper	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.03	0.00	0.00	0.00	0.10	0.01	0.06	0.01
Manganese	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.23	0.02	0.18	0.02
Nickel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.12	0.01	0.08	0.01
Selenium	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.05	0.00	0.00	0.00	0.09	0.01	0.04	0.00
Silver	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uranium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanadium	0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A	0.02	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	0.06	0.01	0.00	0.00	0.15	0.02	0.08	0.01

	Wilson's Snipe								Great Blue Heron								Bald Eagle							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Arsenic	0.07	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Barium	0.02	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Beryllium	N/A	N/A	N/A	N/A					N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Cobalt	0.02	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Copper	0.04	0.00	0.02	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Manganese	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Nickel	0.02	0.00	0.01	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Selenium	0.07	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Silver	0.00	0.00	0.00	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Uranium	0.00	0.00	0.00	0.00					0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
Vanadium	0.03	0.00	0.01	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A
Zinc	0.08	0.01	0.03	0.00					0.00	0.00			N/A	N/A	N/A	N/A	0.00	0.00			N/A	N/A	N/A	N/A

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 26. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Western Drainage, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00					0.05	0.00	0.01	0.00	0.05	0.01	0.01	0.00
Beryllium	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.02	0.00	0.00	0.00	0.22	0.02	0.15	0.02
Cobalt	0.00	0.00	0.00	0.00					0.05	0.00	0.01	0.00	0.05	0.01	0.01	0.00
Copper	0.00	0.00	0.00	0.00					0.05	0.01	0.01	0.00	0.43	0.04	0.30	0.03
Manganese	0.04	0.00	0.01	0.00					0.03	0.00	0.00	0.00	0.05	0.01	0.02	0.00
Molybdenum	0.01	0.00	0.00	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00					0.03	0.00	0.01	0.00	0.05	0.01	0.02	0.00
Selenium	0.04	0.00	0.01	0.00					0.40	0.04	0.03	0.00	0.65	0.07	0.22	0.02
Uranium	0.08	0.01	0.05	0.01					0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Vanadium	0.08	0.01	0.03	0.00					0.05	0.01	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00					0.03	0.00	0.01	0.00	0.30	0.03	0.21	0.02

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 27. Summary of Chronic LOAELa and Adjusted Hazard Quotient Calculations
AOI: Central Drainage PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.01	0.00					0.20	0.02	0.04	0.00	0.20	0.02	0.05	0.00
Beryllium	0.01	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.01	0.00	0.00	0.00					0.15	0.02	0.03	0.00	0.35	0.03	0.18	0.02
Cobalt	0.02	0.00	0.01	0.00					0.31	0.03	0.06	0.01	0.31	0.03	0.06	0.01
Copper	0.01	0.00	0.00	0.00					0.24	0.02	0.05	0.01	0.62	0.06	0.33	0.03
Manganese	0.09	0.01	0.05	0.01					0.05	0.00	0.01	0.00	0.07	0.01	0.03	0.00
Molybdenum	0.01	0.00	0.01	0.00					0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.03	0.00	0.01	0.00					0.42	0.04	0.07	0.01	0.44	0.04	0.08	0.01
Selenium	0.00	0.00	0.00	0.00					0.04	0.00	0.01	0.00	0.29	0.03	0.20	0.02
Uranium	**1.56**	0.2	0.68	0.07					0.17	0.02	0.03	0.00	0.18	0.02	0.04	0.00
Vanadium	0.06	0.01	0.03	0.00					0.04	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.01	0.00	0.00	0.00					0.46	0.05	0.07	0.01	0.73	0.07	0.28	0.03

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available

HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 28. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Upper Eastern Drainage PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00					0.05	0.01	0.02	0.00	0.12	0.01	0.07	0.01
Beryllium	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.02	0.00	0.00	0.00	0.86	0.09	0.64	0.06
Cobalt	0.00	0.00	0.00	0.00					0.03	0.00	0.01	0.00	0.11	0.01	0.06	0.01
Copper	0.00	0.00	0.00	0.00					0.08	0.01	0.02	0.00	0.24	0.02	0.14	0.01
Manganese	0.02	0.00	0.01	0.00					0.01	0.00	0.00	0.00	0.07	0.01	0.05	0.00
Molybdenum	0.01	0.00	0.00	0.00					0.01	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00					0.04	0.00	0.01	0.00	0.11	0.01	0.07	0.01
Selenium	0.00	0.00	0.00	0.00					0.02	0.00	0.01	0.00	**3.30**	0.33	**2.47**	0.25
Uranium	0.03	0.00	0.02	0.00					0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Vanadium	0.05	0.00	0.04	0.00					0.03	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00					0.03	0.00	0.01	0.00	0.23	0.02	0.16	0.02

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ ≥ 1.0 for AHQ Calculations

Table T 29. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Lower Eastern Drainage PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.01	0.00	0.00	0.00					0.10	0.01	0.03	0.00	0.17	0.02	0.08	0.01
Beryllium	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.02	0.00	0.01	0.00					0.38	0.04	0.10	0.01	**1.22**	0.12	0.73	0.07
Cobalt	0.01	0.00	0.00	0.00					0.08	0.01	0.03	0.00	0.15	0.02	0.08	0.01
Copper	0.00	0.00	0.00	0.00					0.10	0.01	0.03	0.00	0.25	0.03	0.15	0.02
Manganese	0.22	0.02	0.14	0.01					0.21	0.02	0.06	0.01	0.26	0.03	0.10	0.01
Molybdenum	0.02	0.00	0.01	0.00					0.03	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Nickel	0.02	0.00	0.01	0.00					0.35	0.04	0.11	0.01	0.43	0.04	0.17	0.02
Selenium	0.01	0.00	0.01	0.00					0.09	0.01	0.02	0.00	**3.36**	0.34	**2.48**	0.25
Uranium	0.09	0.01	0.08	0.01					0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Vanadium	0.06	0.01	0.05	0.00					0.04	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00					0.16	0.02	0.05	0.01	0.36	0.04	0.20	0.02

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 30. Summary of Chronic LOAELa and Adjusted Hazard Quotient Calculations
AOI: Middle Blue Creek PIA, Riparian Drainage
Midnite Mine Site
Wellpinit, WA

Analyte	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00					0.03	0.00	0.01	0.00	0.06	0.01	0.03	0.00
Beryllium	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.04	0.00	0.01	0.00	0.27	0.03	0.18	0.02
Cobalt	0.00	0.00	0.00	0.00					0.05	0.00	0.01	0.00	0.07	0.01	0.02	0.00
Copper	0.00	0.00	0.00	0.00					0.05	0.00	0.01	0.00	0.25	0.02	0.16	0.02
Manganese	0.05	0.00	0.02	0.00					0.05	0.00	0.01	0.00	0.19	0.02	0.12	0.01
Molybdenum	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00					0.08	0.01	0.02	0.00	0.16	0.02	0.08	0.01
Selenium	0.01	0.00	0.00	0.00					0.05	0.00	0.01	0.00	0.22	0.02	0.14	0.01
Uranium	0.03	0.00	0.02	0.00					0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Vanadium	0.04	0.00	0.02	0.00					0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00					0.06	0.01	0.01	0.00	0.31	0.03	0.21	0.02

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations

Table T 31. Summary of Chronic LOAELs and Adjusted Hazard Quotient Calculations
AOI: Lower Blue Creek PIA, Riparian Sediments
Midnite Mine Site
Wellpinit, WA

	Muskrat								Wilson's Snipe							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Conservative		Representative		Conservative		Representative		Conservative		Representative		Conservative		Representative	
Analyte	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ	LOAEL HQ	AHQ
Antimony	0.01	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	0.00	0.00	0.00	0.00					0.05	0.00	0.02	0.00	0.07	0.01	0.04	0.00
Beryllium	0.00	0.00	0.00	0.00					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.23	0.02	0.17	0.02
Cobalt	0.00	0.00	0.00	0.00					0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.00
Copper	0.00	0.00	0.00	0.00					0.03	0.00	0.01	0.00	0.24	0.02	0.17	0.02
Manganese	0.01	0.00	0.00	0.00					0.01	0.00	0.00	0.00	0.15	0.01	0.11	0.01
Molybdenum	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A
Nickel	0.00	0.00	0.00	0.00					0.01	0.00	0.01	0.00	0.10	0.01	0.07	0.01
Selenium	0.00	0.00	0.00	0.00					0.04	0.00	0.02	0.00	0.21	0.02	0.14	0.01
Uranium	0.01	0.00	0.01	0.00					0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Vanadium	0.03	0.00	0.02	0.00					0.02	0.00	0.01	0.00	N/A	N/A	N/A	N/A
Zinc	0.00	0.00	0.00	0.00					0.02	0.00	0.01	0.00	0.28	0.03	0.20	0.02

AOI: Area of interest
AHQ: Adjusted Hazard Quotient
LOAEL: Lowest observable adverse effect level (Chronic)
HQ: Hazard quotient
N/A: Value could not be calculated with the information available
HQ < 1.0
HQ>1 for Chronic LOAEL Calculations
HQ $\geq$ 1.0 for AHQ Calculations